REPORT RESUMES

ED 003 343 24

THE RELATIONSHIP OF CREATIVITY TO SOCIAL CLASS.

BY- SMITH, ROBERT M.
PITTSBURGH UNIV., PA., SCHOOL OF EDUCATION

REPORT NUMBER CRP-2250 PUB DATE JUL 65
CONTRACT OEC-4-10-070
EDRS PRICE MF-$0.27 HC-$5.64 141P.

DESCRIPTORS- CREATIVE ACTIVITIES, *ENVIRONMENTAL INFLUENCES, *SOCIOECONOMIC INFLUENCES, *THOUGHT PROCESSES, PSYCHOLOGICAL EVALUATION, MEASUREMENT INSTRUMENTS, NEGRO ACHIEVEMENT, *CREATIVITY, *SOCIAL CLASS, GRADE 5, VERBAL ABILITY, PITTSBURGH, PENNSYLVANIA

ENVIRONMENTAL FACTORS RELATED TO CREATIVE PRODUCTION WERE STUDIED TO OBTAIN KNOWLEDGE OF THE LEARNING CHARACTERISTICS AND EDUCATIONAL PERFORMANCE OF CHILDREN FROM VARIOUS SOCIOECONOMIC LEVELS. CHILDREN FROM THE FIFTH GRADE WERE SELECTED AS SUBJECTS - 359 NEGRO AND 244 WHITE CHILDREN. FURTHER DIVISION INCLUDED FOUR SOCIOECONOMIC LEVELS. A VARIETY OF MEASURING INSTRUMENTS WERE EMPLOYED TO GATHER THE DATA AND TEST THE VARIABLES. ANALYSES WERE ACCOMPLISHED VIA COVARIANCE ANALYSIS (WITH CORRECTION FOR UNEQUAL, DISPROPORTIONATE MEANS) AND FACTOR ANALYSIS. THE FINDINGS INDICATED SIGNIFICANT DIFFERENCES IN CREATIVE THOUGHT FAVORING THE HIGHER SOCIOECONOMIC CHILD IN MOST VERBAL AREAS. THE LOWER SOCIOECONOMIC CHILD, HOWEVER, PERFORMED BETTER IN THE NONVERBAL AREAS. FURTHER RESEARCH WAS SUGGESTED TO DETERMINE THE SPECIFIC ENVIRONMENTAL FACTORS WHICH INFLUENCE PERFORMANCE IN CREATIVE THOUGHT. (RS)

ED003343

THE RELATIONSHIP OF CREATIVITY TO SOCIAL CLASS

ROBERT M. SMITH, ED.D.
PROGRAM IN SPECIAL EDUCATION AND REHABILITATION
SCHOOL OF EDUCATION
UNIVERSITY OF PITTSBURGH

The research reported herein was supported through the
Cooperative Research Program of the Office of Education,
U.S. Department of Health, Education, and Welfare
COOPERATIVE RESEARCH PROJECT 2250
CONTRACT OE 4-10-070

July, 1965

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

The Relationship of Creativity to Social Class

Robert M. Smith, Ed.D.

School of Education
University of Pittsburgh
July, 1965

Cooperative Research Project 2250
Contract OE 4-10-070

The research reported herein was supported through the
Cooperative Research Program of the Office of Education,
U.S. Department of Health, Education, and Welfare

ACKNOWLEDGMENTS

Conducting educational research is often difficult for reasons other than those related to design, methodology, and instrumentation. Of central concern to the researcher is the need for representative samples. Of equal concern to the administrator and teacher is that disruption of the children's schedule and class time be minimized. This research involved a substantial amount of testing. To Dr. Sidney P. Marland, Superintendent of the Pittsburgh Public Schools, his administrative staff, the principals, teachers, and 5th grade children, the project staff expresses their appreciation for the willing cooperation received. Children from the following Pittsburgh Public Schools acted as subjects:

Brookline School
Chatam School
Columbus School
Conroy School
Cowley School
Crescent School
East Park School
Lemington School
McKelvy School
Miller School
Sunnyside School

Miss Sara A. Willoughby, Mrs. Jane C. Hopkins, and Mr. John T. Neisworth acted as graduate research assistants during various phases of this study and contributed immeasurably to the conduct of it.

Appreciation is expressed to Dr. James J. Gallagher, Dr. J. P. Guilford, and Dr. E. Paul Torrance for permission granted to use instruments and scoring systems which they had developed, or modifications thereof.

The consultation and stimulation provided by many of the investigator's colleagues at the University of Florida and the University of Pittsburgh was particularly helpful during the period of the study. Especial gratitude is expressed to Dr. Jack W. Birch, Associate Dean for Research, School of Education, University of Pittsburgh. The stimulating environment and opportunities for individual initiative provided within the School of Education by Dean Paul H. Masoner made possible the necessary circumstances for conducting research.

The data were processed at the University of Pittsburgh Computer Center which is supported partially by the National Science Foundation, Grant Number G11309.

R.M.S.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS ii

LIST OF TABLES vi

I. INTRODUCTION AND BACKGROUND OF THE STUDY 1
  Review of Literature. 1
    Modes of Cognitive Style 1
    Internal Conditions Associated with Creative Thinking. . . 3
    Social Conditions Associated with Creative Thinking . . . 6
    Research Related to Variations in Child-rearing Practices. 11
    Objectives 14

II. PLAN OF THE STUDY. 15
  General Procedure. 15
  Measuring Instruments, Collection, and Evaluation of Data . 16
    Independent Variables 16
      Intelligence and Achievement 16
      Socio-economic Status 17
    Dependent Variables 20
  Statistical Analysis. 27

III. RESULTS RELATED TO THE HYPOTHESES 36
  Socio-economic Comparisons (White Subjects) 36
  Socio-economic Comparisons (Negro Subjects) 40
  Socio-economic Comparisons (Male Subjects) 43
  Socio-economic Comparisons (Female Subjects). 46
  Socio-economic Comparisons (Races Combined) 49
  Entrepreneurial-Bureaucratic Comparisons 52

IV. RESULTS OF SUPPLEMENTARY ANALYSES 54
  Comparisons Between Males and Females (White Subjects) . . . 54
  Comparisons Between Males and Females (Negro Subjects) . . . 57
  Comparisons Between Males and Females (Races Combined) . . . 60
  Comparisons Between Negro and White Subjects. 63
  Comparisons Between Negro and White, Male Subjects. 66
  Comparisons Between Negro and White, Female Subjects 69
  Comparisons of Intellectually Gifted Subjects with Intellectually Normal. 72
  Comparisons of Intellectually Retarded Subjects with Intellectually Normal. 78
  Summary of Factor Analysis Results 81
  Interaction Effects 88

V. CONCLUSIONS. 90
  Discussion of the Results 90
    Socio-economic Differences Related to Creative Thought . . 90

Entrepreneurial-Bureaucratic Variations 94
Sex Comparisons on Factors of Creative Thought 95
Negro-White Differences in Creative Thinking. 97
General Intellectual Giftedness and Creativity 98
General Intellectual Retardation and Creative Thought. . . 99
Simple Structure of the Variables under Study 101
Implications from the Study 101

VI. SELECTED REFERENCES 104

VII. APPENDICES 108
Appendix A: Evaluative Criteria For Dwelling Area, House Type, Source of Income, and Occupation, and Procedures For Collecting These Data 108
Appendix B: Descriptive Data For The Subjects Under Study 124

LIST OF TABLES

Table / Page

1 A Comparison of Warner's Suggested Social Class Placement With the Socio-economic Levels of this Study. 19

2 Divergent Thinking Matrix in Three Content Areas, With a Summary of the Tests Used to Assess Associated Product Areas 22

3 A Description of the Creativity Tests Used and the Specific Factors Evaluated by Each Instrument . . 24

4 Creativity Test Factors Loadings on Sixth and/or Ninth Grade Students from Earlier Studies . . . 25

5 Descriptive Characteristics of the Subjects 27

6 Statistical Model and Procedures Used for Analysis. . 28

7 Sums of Squares and Degrees of Freedom for each Effect (Either Covariate X or Dependent Y) in the Analysis of Covariance with Disproportionate and Unequal Groups 30

8 Sums of Products and Degrees of Freedom for the Interaction Between Effects in the Analysis of Covariance with Disproportionate and Unequal Groups 31

9 Comparison Between White Subjects at Various Socio-economic Levels on Creativity Variables Related to the *Structure of Intellect* Model 38

10 Comparison Between White Subjects at Various Socio-economic Levels on "Creativity Variables" Not Directly Related to the *Structure of Intellect* Model 39

11 Comparison Between Negro Subjects at Various Socio-economic Levels on Creativity Variables Related to the *Structure of Intellect* Model 41

12 Comparison Between Negro Subjects at Various Socio-economic Levels on "Creativity Variables" Not Directly Related to the *Structure of Intellect* Model 42

Table | Page

13 Comparison Between Various Socio-economic Levels for Males on Creativity Variables Related to the Structure of Intellect Model 44

14 Comparison Between Various Socio-economic Levels for Males on "Creativity Variables" Not Related to the Structure of Intellect Model 45

15 Comparison Between Various Socio-economic Levels for Females on Creativity Variables Related to the Structure of Intellect Model 47

16 Comparison Between Various Socio-economic Levels for Females on "Creativity Variables" Not Related to the Structure of Intellect Model 48

17 Comparison Between Various Socio-economic Levels for Combined Races on Creativity Variables Related to the Structure of Intellect Model 50

18 Comparison Between Various Socio-economic Levels for Combined Races on "Creativity Variables" Not Related to the Structure of Intellect Model . . 51

19 Comparisons Between Entrepreneurial and Bureaucratic, Male and Female Subjects on all Creativity Variables 53

20 Comparison Between White, Male and Female Subjects on Creativity Variables Related to the Structure of Intellect Model 55

21 Comparison Between White, Male and Female Subjects on the "Creativity Variables" Not Directly Related to the Structure of Intellect Model 56

22 Comparison Between Negro, Male and Female Subjects on Creativity Variables Related to the Structure of Intellect Model 58

23 Comparison Between Negro, Male and Female Subjects on the "Creativity Variables" Not Directly Related to the Structure of Intellect Model 59

24 Comparison Between the Combined Negro and White, Male and Female Subjects, on the Creativity Variables Related to the Structure of Intellect Model. . . 61

Table | Page

25 Comparison Between the Combined Negro and White, Male and Female Subjects on the "Creativity Variables" Not Related to the Structure of Intellect Model 62

26 Comparison Between White and Negro Subjects on the Creativity Variables Related to the Structure of Intellect Model 64

27 Comparison Between White and Negro Subjects on the "Creativity Variables" Not Related to the Structure of Intellect Model 65

28 Comparison Between Negro and White, Male Subjects on the Creativity Variables Related to the Structure of Intellect Model. 67

29 Comparison Between Negro and White, Male Subjects on the "Creativity Variables" Not Related to the Structure of Intellect Model. 68

30 Comparison Between Negro and White, Female Subjects on the Creativity Variables Related to the Structure of Intellect Model. 70

31 Comparison Between Negro and White, Female Subjects on the "Creativity Variables" Not Related to the Structure of Intellect Model. 71

32 Comparisons Between Intellectually Gifted and Normal Subjects on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures 75

33 Comparison Between Male and Female Subjects on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures. 76

34 Interaction Effects Between Gifted and Normal, Male and Female Subjects on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures 77

35 Comparisons Between Intellectually Retarded and Normal Children on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures 80

Table		Page
36	Interaction Effects Between Race and Socio-economic Level on All Creativity Variables for the Male Subjects	89
37	Classifications and Definitions for Evaluating Housing Units and Their Associated Penalty Weights	110
38	Classes of Dwelling Areas, Their Respective Penalty Weights, and the Number and Percentage of Subjects Living in Each Dwelling Area.	111
39	Types of Houses, Their Classifications, Ratings, and Assigned Weights.	115
40	Occupational Categories, Examples of Positions Within Each, and the Weight Assigned to Each Classification	118
41	Descriptive Criteria Concerning Source of Income . .	121
42	Descriptive Data on the Four Groups under Study. . .	125
43	Means on the Dependent Variables for White, Male and Female Subjects at Each Socio-economic Level .	127
44	Means on the Dependent Variables for Negro, Male and Female Subjects at Each Socio-economic Level .	128
45	Means for Entrepreneurial-Bureaucratic on All Creativity Variables	129

INTRODUCTION AND BACKGROUND OF THE STUDY

A great amount of research activity is presently being devoted to studying creative thought from various dimensions. Generally, experimenters have limited their work to investigations related to the process, person, product, or environmental factors, which are related to creative thought. Heretofore studies have not considered the relationship between the school-age child's socio-economic circumstance and various factors of creative thought. In fact, a majority of the studies conducted with school-age children have used subjects from heavily biased populations, viz., upper-middle class, university communities. This is particularly alarming in light of two highly related facts; (1) our knowledge concerning the influence of various socio-economic conditions on the cognitive development in young children, and (2) the pressure and effort presently being exerted by many to begin training for creative thinking without being able to fully define the significant parameters.

This study is concerned with investigating one of the factors related to creative thought, here hypothesized as being significant, viz., the socio-economic situation of the child. Evidence, not appearing in literature directly related to creative thought, indicates that children from various socio-economic situations will be quite different in their creative productions.

Review of Literature

Modes of Cognitive Style

One of the five operations defined by Guilford in the Structure of Intellect is divergent thinking. This operation is defined, generally, as the ability to produce a great number of legitimate responses to a stimulus condition. There are at least four other operations described as being important factors of intellect, viz., convergent thinking, cognition, memory, and evaluation.

The convergent dimension of intellect centers around the production of a response which is, for the most part, limited by the information which the individual has been given, the narrowed limits of the situation in which the response is elicited, or the strategy by which the individual manipulates information. Such a method of production uses the memory, evaluative, and cognitive capacities of the individual, but uses them in such a manner that the response pattern emphasizes safety and realism.

The divergent mode of intellectual production also uses information which is at hand, but the person who emphasizes this approach seems to manipulate information in a different fashion. Here the individual is described by his ability to vary his thinking in different directions. Such productions are typically fluent and flexible, and the individual freely experiments, not feeling intellectual limits.

All of us are associated with predominantly one or the other cognitive style as we engage in problem solving behavior. Typically, individuals use both of these hypothesized modes of thinking; however, the primary difference between individuals in this respect is the disposition one has toward using one mode of thinking as opposed to the other. The inter- and intra-environmental variables which influence the disposition one has toward emphasizing one strategy as opposed to the other is a legitimate question.

Getzels and Jackson (1962) have discussed these cognitive styles and the differences between the people who predominantly utilize one or the other in their intellectual activities. These researchers point out that,

> . . . the one mode tends toward retaining the known, learning the pre-determined, and conserving what is. The second mode tends toward revising the known, exploring the unknown, and constructing what might be. A person for whom the first mode or process is primary tends toward the usual or expected. A person for whom the second mode is primary tends toward the nominal and speculative. The one favors certainty, the other risk -- both processes are found in all persons, but in varying proportions. The issue is not one of better or worse, or of more useful or less useful. Both have their place, and both must

> be recognized for their differences, commonalities, interactions, and distinctive functions in the individual's psychic economy. (page 13-14)

Both the individual who prefers to use the mode of thinking which stresses the usual and the individual who tends toward the unusual have certain restrictions placed on them by their environment, as well as by their own attitudes and values. The individual who uses the expected and "safe" mode of intellectual style operates within a more restricted context due to personal temperament and/or his own internalizations of environmental values and attitudes. Thus, this person will give safe and expected intellectual performances which do not violate these restrictions. In contrast, individuals emphasizing the strategy of intellectual thinking which results in an unusual performance, while having similar environmental and personal limitations imposed upon them, are able to temporarily penetrate these barriers and give unexpected performances. The penetration of these barriers for a period of time involves risks which these persons are seemingly willing to take. The remainder of this review devoted to creative thought will consider the literature concerning creativity in individuals from two points of view; (1) from an internal frame of reference and the associated characteristics, and (2) from the point of view of the creative individual's social environment and the restrictions it places upon them.

Internal Conditions Associated with Creative Thinking

Other experimenters and theoreticians have attempted to describe the two modes of thinking by characterizing persons who emphasize a traditional approach as opposed to those emphasizing an unusual strategy for thinking. Rogers (1959) identified in theory the creative person from a phenomenological point of view. He described the creative individual as being open to experiences, as opposed to being psychologically rigid. The need for perceiving environmental situations at the moment and not being distorted by earlier developed defensiveness makes possible free interaction between the permeable boundaries of concepts. The Lewian concept of fluidity and permeability closely parallels this notion of Rogers'.

More important, Rogers, like Maslow (1959), feels that the creative person's source of evaluation must be internal. This provides for a self-actualization which would not emerge when external evaluation is predominant. Closely associated with openness and internal locus of evaluation is the notion that high creative individuals have the ability and desire to toy spontaneously with ideas and concepts. From these unregimented situations arise the guesses concerning possible new ways for seeing a situation. For Rogers, those who are oriented toward a convergent mode of expression are defensive, rigid, not open to experiences, stress external loci of evaluation, and are more anxious.

MacKinnon (1926b)reported generalizations from research that he has conducted on creative adults who were nominated by their colleagues on the basis of their past performances. Results from this study indicated that the most single striking characteristic of this group was that they were open to experience with a relative lack of self-defensiveness. Careful analysis of their psychological protocols showed that these creative individuals apparently were not free from psychological problems, but were frank to admit them and spoke openly of symptoms and complaints. MacKinnon commented,

> . . . the manner in which they described their problems is less suggestive of disabling psychopathology than of richness and complexity of personality and a general candor in self description . . . they reveal . . . that personal soundness is not an absence of problems, but a way of reacting to them. (page 17)

In another report, MacKinnon (1962a) characterized the creative individual as being open-minded and keenly receptive, as opposed to the less creative person who is closed-minded and strongly judgmental. Results from the MMPI for his group indicated that they showed significantly higher scores on the ego-strength scale. Related to this finding was another which suggested that the creative individual eschews the ego-defensive mechanisms of repression and suppression.

In an attempt to identify personality characteristics of creative children, Reid, et al., (1959), administered numerous measures to a group of 7th grade students. The results of this study indicated that creative children tended to be more stable emotionally, self confident, willing to be self-critical, and less anxious than non-creative youngsters. Of tangential interest in this study was the finding that creative boys and creative girls tended to show dissimilar profiles. In their study the girls appeared to be more sensitive, timid, friendly, and kindly, than the boys. In addition, the girls showed willingness to accept cultural standards and seemed favorably disposed toward school. In contrast, the boys revealed more independence, surly reaction to authority, competitiveness, and self confidence than the girls. This is one of the few studies that has considered differences between sexes as a significant variable.

Torrance (1960), reporting on the Minnesota Studies of Creative Thinking, indicated that his sample of highly creative children gave responses on the House-Tree-Person Test which were in many instances so unusual that established criteria were not available to make an evaluation. The responses of these children indicated playfulness, humor, delay of emotional satisfaction, and often showed a feeling of futility in striving for inter-personal relationship.

Other findings from the work at Minnesota seem to indicate that creative children are not averse to working alone, and in most cases they can be considered "self-starters". These children think highly of themselves and are not taken back by temporary impasses. The enjoyment that they receive from playing with ideas has most likely contributed to their persevering without support.

Several different theoretical explanations have been presented attempting to explain why persons who are considered creative use the distinctive style of thinking which Witkin, _et al_., (1954), has termed "field independent" and Schachtel (1959) has discussed as being "allocentric". Hart (1950) believes that creativity is an integrating force based on the happy and guilt-free "disposal of aggression" in a socially acceptable manner. Vaughan (1936), in an earlier document, suggested that creativeness is one of man's fundamental urges. He states that man has the drive to objectify himself through his own creation, which results in the externalization of his ideas.

Social Conditions Associated with Creative Thinking

It is not realistic to contrast internal conditions and external conditions as if interaction does not take place. However, certain researchers tend to place more emphasis on one dimension as being more facilitative or inhibiting than the other. This section will discuss various conditions which are basically social or external to the creative person by reviewing several significant studies concerned with external variables. Subsequently, several theories that have been advanced, which basically describe social conditions, will be discussed.

The type of family environment with which creative children are associated has been one area of recent study. Getzels and Jackson (1961) report on an intensive study they conducted which distinguished high IQ ($\overline{X}$=150), but not concomitantly high in creativity and another group of high creative children who were not concomitantly high in intelligence ($\overline{X}$=127). These investigators were interested in determining the differences in the nature of the family environment of the two groups.

Using Chi-square as the test statistic, results of this study revealed that the parents of the high IQ students were more diligent with respect to the behavior of their children ($P < .05$), were critical of the children and the school ($P < .10$), and more desirous of proper external behavior from the friends of their children ($P < .02$). There was a discrepancy in the ages of the mother and father ($P < .02$), indicating a need for security before raising a family. More of the fathers were centered in university teaching and research positions ($P < .05$) than the parents of the high creative children.

These authors, without benefit of statistical comparisons, generalized on other variables which they felt signified trends. They commented that the parents of the high IQ children tended to be more insecure than the parents of the other group of children. In addition, the parents of the former group had higher occupational goals for their children, and purchased more mass media magazines and less controversial type literature than the latter group's parents. The authors interpreted this to imply that parents from the high IQ homes stress greater conformity and exert greater pressure on the child to do well scholastically than parents from the homes of the high creative youngsters. In direct contrast, the parents of the high creative group focused mainly on the less visible qualities, such as breadth of experience, development of a value system, independence in thinking, and the child's interests and enthusiasms.

Roe (1952) has contributed to a better understanding of the family relationships of eminent scientists. Observing that a large percentage of her sample, which included scientists from many disciplines, had lost one or both parents at an early age, she suggested that this loss can serve to increase early independence in the child. Furthermore, she hypothesized that such a loss in a family helped to establish a pattern of learning that did not necessitate close personal relationships. Another study by Roe (1949) of eminent biologists revealed that close affectial ties were lacking in most of the cases, and that social develment was generally retarded.

Analysis of the personal history protocols given by highly creative adults and reported by MacKinnon (1962b) indicated that these adults did not have a close or intimate relationship with one or both parents. This is most obvious in their relationship with the father. The data show that there were neither strong positive nor negative emotional ties to parents, indicating a serious coolness in parent-child relationships.

This same study reported a complete lack of both physical punishment and formal religious training during the early years of those creative adults. One can infer from this that these adults were given an unstructured environment as children in which they were allowed to explore and establish a personal code of behavior. In short, there appeared to be a distinct lack of imposed control on these people during their childhood, resulting in a great amount of personal autonomy.

Torrance (1962) has studied the results of cultural pressures on children who exhibit high creative thinking abilities. His technique is to have the children write imaginative stories about animals and people, and through their responses he is able to study the effects of externally imposed pressures against creativity and, consequently, creative thinking. His findings show that urban cultures exert stronger sanctions against creative thinking than rural cultures. Minority groups, for example, the Negro in Georgia, also feel strong pressures to conform.

All children who have the ability and desire to give creative productions eventually face a major decision. They must determine how they will react to pressures from society. The production of something which is creative presupposes that the individual will become a minority of one, at least for a period of time. The classic studies by Asch (1952) indicated that few people are able to tolerate being alone in a decision, even when matters of fact are the point on which the judgment is based. How much greater the social pressures are when ideas rather than facts are the points under consideration by outsiders.

The child who continually gives creative productions must decide if he is going to remain silent and sacrifice his creativity, or learn to handle the anxieties which will inevitably result from frequent external denunciations. The former will likely result in lowering favorability of the self concept, in learning difficulties, in behavior problems, or even in psychopathological disorders. The latter will no doubt result in loneliness, conflict, and a more restricted contact with the environment.

Empirical evidence is gradually being gathered to substantiate these hunches. Torrance (1962) has studied the effect of social pressures on children who are creative thinkers. Drevdahl (1956) studied a group of university undergraduates who had been classified into a creative and non-creative group on the basis of their responses on Guilford's tests of creative thinking. The Cattell Sixteen Personality Factor Questionnaire was administered to both of these groups. The results indicated that the creative group appeared to be significantly more withdrawn, calm, self-sufficient, radical, and independent in thinking than the non-creative group. Drevdahl stressed that independence or non-conformity appeared to be desired by these creative college students. Although there is an age difference between Drevdahl's study and those in whom Torrance is interested, these findings still support the notion that the creative person stands alone very often because his social environment will not accept his unusual performances. There is much research interest in the effects of external pressures on divergent thinkers, and still more evidence will be forthcoming.

It has been suggested here, from several of the studies that have been reported, that the social environment may have a direct influence on the creative thinking abilities of children. In contrast to those who have described the dynamics involved in giving a creative performance from primarily an internal frame of reference, other persons view this phenomenon more as a result of social interaction of the person with his environment.

Lasswell (1959) has described creativity from a social perspective. For him, the environment serves as a facilitator and as a restrictor in the process of discovery and recognition of a complete solution to a problem, as well as in the process of carrying out the solution. This author observed how historically a sympathetic audience, frequently of one, provided stimulation for creative figures without adding to the stream of ideas, (e.g., Franklin, Van Gogh, Galileo, Dewey). Lasswell demonstrated his point of view concerning the effects of the social environment on the creative person by describing the social processes underlying Freud's development of psychoanalysis. His description of the social interaction of this creative giant with his environment emphasizes how creative results are the product of an endless chain of social contact.

Describing society as a field of elements, or individuals, who by nature are creative personalities, Dow (1959) states that the main mission of the psychologist and educator should be to determine what outside forces prevent persons from becoming a "complete personality". Rogers (1959) supports this same view, that the tendency to actualize himself exists in every person, and is only waiting, when the proper conditions arise, to be expressed. For him, this means providing an environment in which external forces of evaluation are absent.

Anderson (1959) has provided an interesting analogy concerning the relationship of creative man with his environment by discussing biological development. He feels that differences in the organism do not always result in conflict, but that an integration of differences often results in positive action. Cell differentiation is an example of this phenomenon. He points out that "socially integrated behavior" can lead to a creative growth cycle in an individual. For Anderson, the environment can be either open and facilitating, or closed and inhibiting.

Schachtel (1959) takes exception to the Freudian and neo-Freudian explanation of creative thinking. His argument against the notion of primary process being the seat for creativity is basically social. The explanation he presents makes use of two terms. The "autocentric" or subject centered mode describes the individual who is not open to the world, and who reacts in terms of how the action affects him or his security. The "allocentric" or object centered mode describes the person who is perceptually open to the world and not directly concerned with self pleasure. There is a sense of exploration associated with this mode, and the person described by it has developed from the childhood "autocentric mode" to the "allocentric mode" of perception.

"Secondary autocentricity", according to Schachtel, develops in everyone in a metamorphic fashion, resulting in a person being in a constant state of struggle between these two modes of operating within society. The creative person is one who, in the face of this struggle, is able to show victory in an "allocentric" manner.

The creative individual's motivation, Schachtel believes, comes from man's need to interact with the world. The need to strive toward relating to others, objects, and toward the unfamiliar is a basic force in these persons. The kind of experience which these individuals encounter, and the extent to which they are able to remain apart from cultural and personal "autocentricity" determines the degree of creativity which they will exhibit.

The Freudian notion of reducing basic drives of the id and the sanction of such reduction by the ego contrasts sharply with Schachtel's beliefs that "tension seeking" is the basic factor involved in giving a creative production.

Roe (1953), agreeing with others who believe that the creative approach is inherent in the human organism, has presented a theoretical model describing ways to handle children and has related this to creativity.

She suggests that it is more difficult to get free flowing creativity in family situations in which the emotional concentration is on the child in forms of either over-protecting or over-demanding parents. Conversely, she indicates that creativity is more readily enhanced in an environment which is accepting and casual, or even avoiding and neglectful. Therefore, according to Roe, much of our scientific talent is currently being overlooked.

Research Related to Variations in Child-Rearing Practices.

Results of research on differences in child-rearing practices between the middle social class and the lower social class relate in certain ways to the differences in the philosophy of child-rearing held by the parents of the high creative and low creative children in the study by Getzels and Jackson. These differences relate to the fostering of independence and dependence in behavior and thought. Although current literature suggests that neither socio-economic group consistently grants more independence to children, several significant differences do exist in their child-rearing practices. Middle class parents generally are viewed as more permissive of the child's behavior early in life and of his behavior within the family situation. They are less severe in toilet training and in weaning practices (Klatskin, 1952; Sears, Maccoby, and Levin, 1957). Middle class parents are characterized as permitting their children to communicate openly with them, to select their own occupations, to exhibit instances of developmentally immature behavior in interacting with parents more often than do lower class parents (Ausubel, 1958; Sears, Maccoby, and Levin, 1957).

Ausubel (1958) however, has pointed out that lower class parents are more permissive of the child's behavior outside the home than are middle class parents. Lower class children are more free to come and go at will, to leave the house alone, to select their companions, and to explore the life of the street. On the other hand, middle class parents tend to encourage conformity outside the home; encouraging their children to be punctual and orderly, to respect authority and property, to conform to conventional standards of behavior, and to participate in religious activities.

The diverse methods of behavioral control employed by parents from the two social classes are also significant in that they appear to be related to fostering of independent or dependent behavior. The middle class parent, who wants his child to learn to act and to make decisions for himself, is concerned that the child develop an internal behavior control mechanism. This parent is, therefore, supportive, warm, and often uses withdrawal of love in controlling the child's behavior. The lower class parent, however, is mainly concerned that his child act reputably, and so the parent controls the behavior of the child by imposing restraints, punishing, and withdrawing privileges (Sears, Maccoby, and Levin, 1957; Kohn, 1953; Swinehart, 1963; Kohn and Carroll, 1960).

Most significant here is the effectiveness of these two types of behavior control. Sears, Maccoby, and Levin (1957) point out that while the child who has been dealt with by a warm mather matures more rapidly in social behavior, he is also more susceptible to control by his mother. Physical punishment, however, is ineffective in controlling behavior over a long period of time. It is reasonable to conclude, then, that the middle class mother exerts more influence over her child's behavior than does the lower class mother. This is in agreement with Ausubel's position, also, that the lower class child achieves earlier "desatellization" and independence than does the middle class child (1958).

Parental reactions to aggressive and dependent behavior have been reported also as they differ between social classes (Sears, Maccoby, and Levin, 1957; Ausubel, 1958; Pope, 1953). While there is an equal tendency for both social classes to encourage aggressive behavior, differences exist in their reactions to a child's dependency. Lower class mothers are irritated by, and sometimes punish a child's dependency, while middle class mothers are more permissive of this behavior. In some areas middle class mothers even encourage dependency, e.g., in financing college education.

It can be seen, then, that the differences in child-rearing practices between the lower and middle social classes do affect the child's development of a predisposition toward engaging in independent behavior. While middle class parents encourage independence in early years, and within the family structure, they also exert more behavioral control over their children. (However, lower class children, whose independence is granted outside the home, and whose internal behavior control is not parentally influenced, should be more independent and autonomous than middle class peers.)

Differences in the child-rearing practices between the sexes are also obvious. These differences are related primarily to the distinctive cultural norms for boys and girls. Boys are expected to be more aggressive, rebellious, competitive, non-conforming, and uncooperative. Girls are expected to be sensitive and obedient to social controls, cooperative, and accepting of authority (Ausubel, 1958; Tuma and Livson, 1960). In addition, Sears, Maccoby, and Levin (1957), point out the contrasting punishment techniques used for boys and girls. Boys are frequently recipients of physical punishment, similar to that which is received by a lower class child. Girls are more often punished by withdrawal of love, similar to the method employed by the middle class parents. The behavior of girls, then, is managed by a method which makes them susceptible to subsequent parental control. Ausubel (1957) concludes that girls "satellize" more and longer than boys do as a result of the differential treatment of boys and girls by parents.

The occupation of the father seems to be an important factor in child-rearing practices. Miller and Swanson (1958) have reported that homes in which the father is engaged in a business of a "risk-taking" nature allow the children more independence and exert less external control than in homes where the father is working for someone else in a large organization. One might speculate that this philosophy regarding child-rearing practices, which emphasizes willingness to take risks, will be generalized, and that children from "enterpreneurial" homes, i.e., risk-taking irrespective of the associated social class, will be more frequently associated with the creative mode of thinking than those children from "bureaucratic" homes where risk-taking is not emphasized.

OBJECTIVES

The major objective of this investigation was to study intensively the relationship between the responses of public school 5th grade children to tests evaluating factors of creative thought and the socio-economic situation with which each child is associated. Relationships between other variables such as intellectual ability and achievement were studied. In addition, differences in the responses to the creativity tests by males, females, Negroes, and whites were investigated.

The specific hypotheses for the primary aspect of the study were as follows:

H_1: Children from lower class families will differ significantly from children associated with middle class homes in both their verbal and non-verbal creative productions.

H_2: Children irrespective of social class, who are from homes where the father is engaged in a business of a "risk-taking" nature will be more creative than children from homes where the father is working for someone else.

PLAN OF THE STUDY

General Procedure

Male and female children who were in the 5th grade constituted the population from which samples were chosen for study. A total of 359 Negro and 244 white children from either generally lower or middle socio-economic sections of Pittsburgh participated in the study.

Data related to the socio-economic variables as evaluated by the Index Status Characteristics were collected on each child. These data were evaluated, classified, weighted, and quantified; divisions between socio-economic levels were made separately for the Negro and white subjects using the criteria suggested by Warner (1960). The socio-economic variables of concern were: (1) occupation of the head of the household, (2) source of income, (3) dwelling area, and (4) house type.

Scores from the Kuhlmann-Anderson Intelligence Test and the Metropolitan Achievement Test were available for each child from the school records. In addition, the 604 subjects were administered eight paper and pencil tests which evaluate factors generally considered to be measures of creative thought.

The independent variables in this study were race, sex, and socio-economic position. Intelligence and average achievement were covariants. All of the scores on the creativity tests were considered as dependent variables. The data were analyzed on each dependent variable using a two-way analysis of covariance procedure, separately covarying intelligence and average achievement for the Negro subjects and the white subjects independently. The following diagram illustrates the general design.

Socio-Economic Position

		1 Higher	2	3	4	5 Lower
Sex	Male					
	Female					

From the total, subjects were identified according to whether or not their fathers worked for themselves. A total of 36 subjects were so identified and labeled as coming from entrepreneurial homes. Each of these subjects was matched on IQ, achievement, sex, and race with another subject whose father worked for someone else associated with a major business concern. A total of 36 subjects were identified and labeled as being associated with bureaucratic homes. Scores on the dependent variables between these two groups of subjects were analyzed using a one-way analysis of variance procedure.

Measuring Instruments, Collection, and Evaluation of Data

Independent Variables

Intelligence and Achievement Measures: Scores from the Kuhlmann-Anderson Intelligence Test, which had been administered at the end of the 4th grade, were available from the school records. No subject with a recorded IQ score less than 85 was admitted to the study. The Metropolitan Achievement Test had also been administered to all of the subjects at the end of the 4th grade. These scores were recorded from the school folder of each child and, for the purposes of this study, the average achievment was the score used as the covariant.

Socio-economic Status: The Index of Status Characteristics was used to evaluate the socio-economic position of each child in the study. This scale has been widely used as a measure of social class placement in suburban areas as well as in large metropolitan areas.*

The weights assigned to the variables contained in the Index of Status Characteristics suggested by Warner are as follows:

Status Characteristics	Weight
Occupation	4
Source of Income	3
House Type	3
Dwelling Area	2

In this study, an individual's total socio-economic position was calculated by multiplying the rating for Occupation by 4, the rating for Source of Income by 3, the rating for House Type by 3, and the rating for Dwelling Area by 2. The products from the rating on each socio-economic variable and the appropriate weighting were totaled, providing a total weighted index of socio-economic circumstance. The mean weighted score for the white subjects on the Warner Scale was 47.7 with a standard deviation of 16.7. For the Negro subjects the mean weighted score was 61.3 with a standard deviation of 12.3.

It was necessary for each subject to be assigned to a socio-economic level according to race. Because of the relatively large number of subjects in both groups, it seemed advisable to identify more than upper and lower socio-economic groups. Furthermore, it was decided to adhere as closely as possible to the suggested social class placements used by Warner. The decision was made to combine several of Warner's social class levels and to divide both the Negro and white subjects into four socio-economic levels. Table 1 compares the Warner social class placement with the collapsed version used in this study.

---

* The evaluative criteria for Source of Income, Occupation, Dwelling Area, and House Type, along with the procedures used in collecting these data appear in Appendix A at the end of this report.

The number of male and female subjects for both the Negro and white population at each of the four socio-economic levels, along with other descriptive information, is summarized under the section devoted to a description of the subjects. It will suffice to say at this point that the Negro and white populations differed significantly in terms of the number of subjects located at each of the four socio-economic levels. Therefore, it seemed desirable to do a separate analysis for both of these populations.

Table 1

A Comparison of Warner's Suggested Social Class Placement with the Socio-economic Levels of this Study

Warner's Social Class Placement	Weighted Totals on Four Socio-economic Variables	Socio-economic Levels of this Study
Upper Class	12	
	13-17	
	18-22	Level I Upper Middle Socio-economic Level (18-37)
Upper-Middle Class	23-27	
	28-32	
	33-37	
Lower-Middle Class	38-41	Level II Lower Middle Socio-economic Level (38-53)
	42-46	
	47-51	
Upper-Lower Class	52-56	
	57-61	Level III Upper Lower Socio-economic Level (54-68)
	62-66	
Lower-Lower Class	67-71	
	72-75	Level IV Lower-Lower Socio-economic Level (69-87)
	76-84	

Dependent Variables

Numerous studies have attempted to identify the specific factors related to creative thinking. Perhaps the most complete work in this area has been conducted by Guilford and his associates, who, in their study of the Structure of Intellect, have recorded the major factors of creative thought as being (1) sensitivity to problems, (2) fluency of ideas, (3) flexibility of ideas, and (4) originality. Wilson (1954) supported these findings. The specific dimensions related to Guilford's Structure of Intellect have been recorded elsewhere (1960). Briefly, he presented a model describing the human intellect in terms of five operations (cognition, memory, convergent thinking, divergent thinking, and evaluation), four contents (figural, symbolic, semantic, and behavioral), and six products (units, classes, relations, systems, transformations, and implications).

It was observed that the more conspicuous creative abilities seemed to center around divergent thinking operations. In this respect, Guilford stated that

> ". . . it is apparent that the traits of fluency and flexibility come in the general category of divergent thinking, but that it would be incorrect to say that divergent thinking accounts for all the intellectual components of creative production." (1960, p.137)

The results of factor analytic studies have generally supported this observation by Guilford.

The decision was made in this study to evaluate as many of the dimensions of creative thought as practical; and to use as much as possible the findings from the factor analytic studies conducted by Guilford and his associates as the principal criterion for choosing the instruments to evaluate the dependent variables. The reports of factor analytic studies were inspected and tests tentatively selected to evaluate factors of creative thought. Since the study was concerned with assessing 5th grade children, it was necessary at times to compromise by selecting an alternate test due to Guilford's tests having been developed initially with older children and adults. Through a pilot study it was found that in certain cases 5th grade children could not respond adequately to several of the tests; for example, the instrument suggested for expressional fluency was too difficult for these subjects. For this reason, and because of limited time available for testing, it was not possible to evaluate each of the product and content categories in the divergent thinking matrix. Table 2 illustrates the creativity factors evaluated and tests used.

Table 2

Divergent Thinking Matrix in Three Content Areas, With a Summary of the Tests Used to Assess Associated Product Areas

Product Categories	Content Categories		
	Figural	Symbolic	Semantic
Units	7a	1	2, 4a, 5a
Classes	7b		4b
Relations			3
Systems	6		
Transformations	7c		5b
Implications	7d		

KEY:

Test No.	Test Name
1.	WORD FLUENCY
2.	IDEATIONAL FLUENCY
3.	ASSOCIATIONAL FLUENCY
4.	UNUSUAL USES a. Total Score b. Shifts Score
5.	CONSEQUENCES a. Obvious Score b. Remote Score
6.	MAKING OBJECTS
7.	CIRCLES a. Total Score b. Shifts Score c. Originality Score d. Elaboration Score
8.	SEEING PROBLEMS (Evaluative-Semantic-Implications)

With one exception, tests used in this study had reported factor loadings greater than .30 on the dimensions of creative thought being assessed. The Circles Test, having been developed by Torrance, had not been included in factor analytic studies. It was felt, however, that an attempt should be made to assess the figural content area since lower socio-economic children were to be included as subjects. The various dimensions evaluated by the Circles Test were related to the descriptions of the various product areas of the figural dimensions provided by Guilford (Taylor, 1964). The dimensions evaluated by the Circles Test seemed logically consistent with the various factors in the figural content area, and, therefore, it was included in the battery.

One other point aside from their reliability and validity was considered in choosing the tests. It seemed advisable to choose instruments which would assess more than one factor of creative thought. By scoring the responses of the subjects to each test in a different way, it was possible to assess more than one factor.

Eight tests were finally selected to evaluate the dependent variables. A description of each test with the factor in the Structure of Intellect model it evaluates and the common factor name for each is provided in Table 3.

As has been indicated earlier in this report, tests were chosen primarily on the basis of their factor loadings in previous studies. In the absence of other validity information relative to the creativity tests, evidence concerning factoral validity was considered to be an adequate indicator of validity. This procedure was followed in every instance except with the Circles Test. Guilford has summarized the factor loadings in the tests chosen for this investigation on 6th and 9th grade students (Taylor, 1964). This information is summarized in Table 4. Research by other scientists using factor analytic procedures have consistently substantiated the findings by Guilford concerning the factor loadings (Drevdahl, 1965; Atkins, 1951; Kettner and others, 1959).

Table 3

A Description of the Creativity Tests Used and the Specific Factors Evaluated by Each Instrument

Creativity Test	Structure of Intellect Factor Evaluated			Description of Test	Common Factor Name
	OPERATIONS	CONTENTS	PRODUCTS		
Word Fluency	Divergent	Symbolic	Units	Write words containing a specific letter, e.g., the letter "L".	Word Fluency
Ideational Fluency	Divergent	Semantic	Units	Write names of things which fit into broad classes, e.g., things that are "green" and "can be eaten".	Ideational Fluency
Associational Fluency	Divergent	Semantic	Relations	Write synonyms for each of several different words, e.g., for the word "fair".	Associational Fluency
Unusual Uses (Total)	Divergent	Semantic	Units	Write different ways to use an object, e.g., ways to use a shoe. Score for total number of responses.	Ideational Fluency
Unusual Uses (Shifts)	Divergent	Semantic	Classes	List ways to use an object, e.g., a shoe. Score for number of shifts in classes in consecutive responses.	Spontaneous Flexibility
Consequences (Obvious)	Divergent	Semantic	Units	List consequences of an unusual event, e.g., pills used for food. Consider only responses scored as obvious.	Ideational Fluency
Consequences (Remote)	Divergent	Semantic	Transformations	List consequences of an unusual event, e.g., pills used for food. Consider only responses scored as remote.	Originality
Making Objects	Divergent	Figural	Systems	Provided with a few figures and lines construct from them, by adding no extra lines, a specified object, e.g., an ice cream cone.	- -
Seeing Problems	Evaluative	Semantic	Implications	List problems that might occur in connection with an object, e.g., peach.	Sensitivity to Problems
Circles (Total)	Divergent	Figural	Units	Given a number of circles, draw different objects in a specified period of time. Score for total number of responses.	Non-Verbal Fluency
Circles (Shifts)	Divergent	Figural	Classes	Given a number of circles, draw different objects in a specified period of time. Score for number of shifts in classes in consecutive responses.	Non-Verbal Flexibility
Circles (Originality)	Divergent	Figural	Transformations	Given a number of circles, draw different objects in a specified period of time. Score using a weighting system.	Non-Verbal Originality
Circles (Elaboration)	Divergent	Figural	Implications	Given a number of circles, draw different objects in a specified period of time. Score using the basic criteria for elaboration related to specific objects.	Non-Verbal Elaboration

Table 4

Creativity Test Factor Loadings on Sixth and/or Ninth Grade Students from Earlier Studies

Test	Factor	Factor Loading
Word Fluency	Word Fluency	.49
Ideational Fluency	Ideational Fluency	.50
Associational Fluency	Associational Fluency	.45
Unusual Uses (Total)	Ideational Fluency	.48
Unusual Uses (Shifts)	Spontaneous Flexibility	.45
Consequences (Obvious)	Ideational Fluency	.51
Consequences (Remote)	Originality	.49
Making Objects	Divergent-Figural-Systems	.36
Seeing Problems	Sensitivity to Problems	.50

Inter-scorer reliability checks were made on each creativity variable on every test. Three judges scored independently 20 randomly selected protocols after having studied the scoring system and consulted as a group on the procedures. In every case, the correlations were above .92 between judges.

Principals in each of the eleven elementary schools participating in the study were contacted and two testing sessions scheduled for each school. The children in each of the schools were tested in their homerooms on consecutive mornings. It was possible to schedule the administration of four tests on one morning and four on the next morning. The tests were administered in the same sequence for all children using previously developed standardized directions. The period of time allowed for each test was consistent with that suggested by the appropriate test manuals.

After all the data were collected, the tests were each coded with an I.D. number and made ready for scoring. Basically, the scoring procedures used to evaluate the responses from the subjects were those recommended by the authors of the instruments. As the project staff prepared for scoring, it became obvious that certain modifications in the scoring criteria on several tests would be desirable in terms of effecting greater scoring objectivity and, thus, inter-scorer reliability. To this end, minimal alterations were made in several scoring systems.*

The subjects selected for study were chosen from the 5th grade population in the Pittsburgh Public Schools. Eleven elementary schools were selected on the basis of their representing, in a general sense, lower socio-economic and middle socio-economic neighborhoods. Additional consideration in the selection of the schools was given to obtaining an adequate sample of both Negro and white children. Principals of the eleven elementary schools were contacted, and the folders of the 5th grade children in each of these schools were inspected to determine the number of subjects available, and to gather all data relevant to the project. Approximately 900 children were initially identified for study. It was necessary to remove a number of subjects from the final analyses due to their not meeting the basic criterion of I.Q. equal to 85, being absent during one or both of the testing sessions, or for reasons resulting in there being incomplete data on one or more of the independent or dependent variables.

---

*The scoring standards for all of the creativity tests used in this study (with exception of the Circles Test), together with examples of scored protocols, have been deposited with the Sheridan Supply Company, P.O. Box 837, Beverly Hills, California. Direct all inquiries concerning instruments and their scoring systems to the above address.

The subjects were located in one of the four socio-economic levels, according to the procedures described in a previous section of this report. Table 5 provides descriptive characteristics of the subjects used in the final analyses.

Table 5

Descriptive Characteristics of the Subjects

Race	Sex	Socio-Economic Level 1=higher 4=lower	Warner Scores	No.	Mean K-A (end 4th grade)	Mean Metro. (end 4th grade)
Negro	Male	1	(23-37)	8	108	5.7
		2	(38-53)	48	98	5.0
		3	(54-68)	77	99	5.0
		4	(69-87)	36	99	4.8
Negro	Female	1	(23-37)	7	105	5.6
		2	(38-53)	40	106	5.4
		3	(54-68)	81	100	5.8
		4	(69-87)	62	97	4.7
White	Male	1	(23-37)	46	114	6.6
		2	(38-53)	39	104	5.6
		3	(54-68)	23	101	4.9
		4	(69-87)	10	102	4.9
White	Female	1	(23-37)	42	115	6.7
		2	(38-53)	39	111	5.9
		3	(54-68)	34	103	5.0
		4	(69-87)	12	101	4.9

Statistical Analysis

In order to test the hypothesis concerning differences between the four socio-economic levels on their responses to the various creativity measures, an analysis of covariance procedure with correction factors for unequal, disproportionate means was used. The independent variables in this study included sex and socio-economic level, as assessed by Index of Status Characteristics. The dependent variables were 13 factors of creative thought, as assessed by tests developed by Guilford and Torrance. Intelligence scores from the Kuhlmann-Anderson Intelligence Test and achievement scores from the Metropolitan Achievement Test were covaried, each in a separate analysis of covariance. Separate analyses were done for the Negro and for the white subjects.

All of the raw scores necessary for statistical analyses to be performed were organized for each subject in the eight cells, keypunched on IBM cards, and processed at the University of Pittsburgh Computer Data Processing Center. An analysis of covariance program for unequal, disproportionate means was prepared for use on the IBM Electronic Computer Model 7090. Table 6 describes the general model and procedures used in the analysis of covariance procedure to test the first hypothesis.

Table 6

Statistical Model and Procedures Used for Analysis

j i	SE1 (18-37)	SE2 (38-53)	SE3 (54-68)	SE4 (69-87)
Female 1	$x_{11}\cdots x_{11n}$ $y_{11}\cdots y_{11n}$	12	13	14
Male 2	21	22	23	24

Example: x_{223} = IQ or Achievement score for S.E. level 2, male, subject number 3

y_{223} = Score on one of the creativity variables for S.E. level 2, male, subject number 3

Symbols used in the model represent the following:

i = sex (rows)
j = socio-economic level (columns)
k = number of subjects per cell
x = covariate measure (either IQ or Achievement)
y = dependent variable

For each cell N, $\sum X$, $\sum Y$, $\sum X^2$ and $\sum XY$ were computed. To test the main effects and their interaction, the sums of squares and degrees of freedom for each were needed. In addition to determining homogeneity of variance for each dependent variable, it was necessary to test for equality of the regression slopes for each of the eight cells in order to satisfy the assumption that the slope of the individual regression lines do not deviate significantly from a common regression line. The .01 level of significance was used in this determination. The data needed to test the basic assumptions for the analysis of covariance procedure were obtained from the computer print-outs.

Tables 7 and 8 provide a description of the procedures used for obtaining the sums of squares and degrees of freedom for each effect and their interaction.

Table 7

Sums of Squares and Degrees of Freedom For Each Effect
(Either Covariate X or Dependent Y)
in the Analysis of Covariance With Disproportionate
And Unequal Groups

Source of Variation	Degrees of Freedom	Sum of Squares	(X scores used for covariate) (Y scores used for dependent variables)
Between Sexes	I - 1	$\frac{\sum \bar{X}_{1}.^{2}}{J} - \frac{\bar{X}.\,.^{2}}{IJ}$	
Between Socio-Economic Levels	J - 1	$\frac{\sum \bar{X}.^{2}{}_{j}}{I} - \frac{\bar{X}.\,.^{2}}{IJ}$	
Interaction (Sex X S.E.L.)	(I - 1) x (J - 1)	$\sum\sum \bar{X}_{ij}^{2} - \frac{\sum \bar{X}_{1}.^{2}}{J} - \frac{\sum \bar{X}^{2}.j.}{I} + \frac{X^{2}.\,.}{IJ}$	
Error	n. .-IJ	$\sum\sum\sum \bar{X}_{ij}K^{2} - \frac{\sum\sum X_{1}j^{2}}{n^{2}j}$	
Error Adjustment	(n. .-IJ) minus (1)	$\sum\sum\sum \bar{X}_{ij}K^{2} - \left(\frac{\bar{X}_{ij}}{n_{ij}}\right) X \left(\frac{\frac{1}{n_{11}} + \frac{1}{n_{12}} \cdot\,\cdot\,\cdot \frac{1}{n_{24}}}{\text{no. of cells}}\right)$	

Table 8

Sums of Products and Degrees of Freedom for the Interaction Between Effects in the Analysis of Covariance With Disproportionate and Unequal Groups

Source of Variation	Degrees of Freedom	Sums of Products	(XY)
Between Sexes	(I - 1)	$\frac{\sum \bar{X}_{i}.\ \bar{Y}_{i}1}{J} - \frac{\bar{X}.\ .\ \bar{Y}.\ .}{IJ}$	
Between Socio-Economic Levels	(J - 1)	$\frac{\sum \bar{X}._{j}\ \bar{Y}._{j}}{I} - \frac{\bar{X}.\ .\ \bar{Y}.\ .}{IJ}$	
Interaction (Sex X S.E.L.)	(I - 1) x (J - 1)	$\sum\sum \bar{X}_{ij}\ \bar{Y}_{ij} - \frac{\sum \bar{X}_{i}.\bar{Y}.}{J} - \frac{\sum \bar{X}_{i}\ \bar{Y}._{j}}{I} + \frac{\bar{X}.\ .\ \bar{Y}.\ .}{IJ}$	
Error	n. .-IJ	$\sum\sum \bar{X}_{ij}K\ \bar{Y}_{ij}K - \frac{\sum\sum \bar{X}_{ij}.\ \bar{Y}_{ij}.}{n_{ij}}$	
Error Adjustment	(n. .-IJ) minus (1)	$\left(\sum\sum\sum \bar{X}_{ij}K\ \bar{Y}_{ij}K - \frac{\sum \bar{X}_{ij}.\bar{Y}_{ij}}{n_{ij}}\right) X \left(\frac{\frac{1}{n_{11}} + \frac{1}{n12} + \frac{1}{n_{24}}}{\text{no. of cells}}\right)$	

The data indicated by the model can be used with hand computational procedures to determine the sums of squares for X and Y variables and sums of squares for the cross products of the X and Y variables for the hypothesis concerning socio-economic levels:

$$\text{SSX (columns)} = \frac{\sum \bar{X}_{i}.^{2}}{J} - \frac{\bar{X}^{2}. .}{IJ}$$

$$\text{SSY (rows)} = \frac{\sum \bar{Y}_{i}^{2}}{IJ} - \frac{\bar{Y}^{2}}{IJ}$$

$$\text{SP} = \frac{\sum \bar{X}_{i}. \; \bar{Y}_{i}.}{J} - \frac{\bar{X}. \; . \; \bar{Y}. \; .}{IJ}$$

The sums of squares for the error adjustment for X and Y are then subsequently computed.

$$\text{SSX e adj.} = \sum\sum X_{ij}K^{2} - \left(\frac{X_{ij}}{n_{ij}}\right) X \left(\frac{\frac{1}{n_{11}} + \frac{1}{n_{12}} \cdot \; \cdot \; \cdot \frac{1}{n_{32}}}{\text{no. of cells}}\right)$$

The symbol $\sum\sum\sum X_{ij}K^{2}$ represents all the scores on the X variable squared and summed for all cells. From this $\left(\frac{X_{ij}}{n_{ij}}\right)$ was subtracted. The resulting figure is multiplied by

$$\left(\frac{\frac{1}{n_{11}} + \frac{1}{n_{12}} \cdot \; \cdot \; \cdot \frac{1}{n_{32}}}{\text{no. of cells}}\right),$$

the adjustment made when there are unequal and disproportionate numbers in the cells. Since the eight cells in the experimental design of this study were unequal, the adjustment was necessary and appropriate. The same adjustment was appropriate for the sums of squares for X and XY. To obtain the sums of squares for socio-economic level plus error, the sums of squares, and the sums of squares for the error adjustment of X, Y, and XY were added together.

The next step involved obtaining the socio-economic level plus error covariance, the error covariance, and the socio-economic level covariance. The sums of products, socio-economic level plus error squared, divided by the sums of squares for X, socio-economic level plus error was subtracted from the sums of squares for Y, socio-economic level plus error to obtain the Y sums of squares for socio-economic plus error.

$$SSY^{1}_{S.E.L.}\text{t e} = SSY_{S.E.L.}\text{t e} - \frac{SP_{S.E.L.\ +\ e}^{2}}{SSX_{S.E.L.}\ +\ e}$$

To obtain the error covariance, the sums of squares for the sums of products, error adjusted squared, divided by the sums of squares for X, error adjusted, was subtracted from the sums of squares for Y error.

$$SSY^{1}e = SSYe - \frac{SP\ e\ adj.^{2}}{SX\ e\ adj.}$$

This is the adjustment for the effect of differences in intelligence or achievement (whichever appropriate) on the sums of squares of the dependent variables. To obtain socio-economic level plus error covariance, the error covariance is subtracted from the method plus error covariance.

$$SSY^{1}_{S.E.L.} = SSY^{1}_{S.E.L.}\ \text{t e} - SSY^{1}e$$

The F test was used to test the significance of difference between socio-economic level and mean square for error, the adjusted sums of squares for socio-economic level and error were divided by the appropriate degrees of freedom.

$$\frac{SSY^{1}_{S.E.L.}}{df} = \text{Mean Square for Socio-economic level}$$

$$\frac{SSY^{1}_{e}}{df} = \text{Mean Square for Error}$$

The F value is then obtained thusly:

$$F = \frac{\text{Mean Square for Socio-economic level}}{\text{Mean Square for Error}}$$

Using the table of F, the significance of the value in terms of probability was noted. In this study, the values obtained were accepted or rejected at the .05 level of significance.

Each of the main effects and their interaction can be tested using the procedure described. A program was written to be used on the IBM Computer, Model 7090.

In order to test the hypothesis concerning differences in the responses on the dependent variables between the entrepreneurial and bureaucratic subjects, an analysis of variance procedure was used. This procedure was chosen since neither group was significantly different from the other on intelligence scores and achievement. Scores on all of the dependent variables between the two groups of subjects were analyzed using the one-way analysis of variance procedure.

In addition to the analyses related to the major hypotheses of the study, other procedures were used with certain sub-groups of the total population. For example, subjects scoring greater than IQ 120 on the Kuhlmann-Anderson Intelligence Test were identified and compared with a group of intellectually normal children (IQ between 90 and 110). Similarly, a group of educable mentally retarded children (IQ below 80) were identified and matched with a separate group of intellectually normal children (IQ between 90 and 110). These groups were compared with their normal controls on the dependent variables using procedures such as analysis of covariance, correlation, and factor analysis. Other supplementary analyses were made between and within the Negro and white populations. The results of these analyses and the statistical procedures used in evaluating the responses of the subjects will be described in the section of the next chapter devoted to supplementary analyses of the data.

RESULTS RELATED TO THE HYPOTHESES

The results concerning the socio-economic hypothesis and the entrepreneural-bureaucratic hypothesis are presented in this chapter. Results related to sex and race differences, an analysis of a subsample of gifted and retarded subjects, and a factor analysis of the scores are presented in the following chapter.

Socio-economic Comparisons (White Subjects)

A 2 x 4 (sex x socio-economic level) analysis of covariance, adapted for unequal and disproportionate N's in each cell, was used to evaluate the subjects' responses on the dependent variables. Two analyses were done with intelligence and achievement separately covaried. Table 9 presents the results for the white subjects on each of the variables which are directly related to the *Structure of Intellect* model. Table 10 provides results for the white subjects on those dependent variables considered to be related to creativity but not heretofore related to the *Structure of Intellect* model. The mean values on these variables for white and Negro, males and females at each socio-economic level appear in Appendix B.

The results summarized in Table 9 indicate, with IQ covaried, that children from relatively higher socio-economic circumstances scored above those subjects in the lower socio-economic levels on six of the thirteen creativity variables. The level of significance was less than .05 in each case except one, and that was less than .10. The six variables on which these differences were noticed involved the subjects' responding in a verbal fashion. With achievement covaried, two of the variables were significant beyond the .05 level. On five of the variables, with IQ covaried, the lower socio-economic children exceeded the higher level children with a probability less than .05, with the exception of one variable which was at the .10 level. Inspection of the variables on which these findings were noted indicates that the lower socio-economic subjects scored higher on tests measuring non-verbal creativity factors than did the higher socio-economic subjects. The findings on these variables were consistent when achievement was covaried.

On those variables ostensibly measuring factors of creative thought, but not as yet directly related to the Structure of Intellect, higher socio-economic subjects scored above lower socio-economic subjects on five of the nine factors with IQ covaried, and on two of the nine with achievement controlled. The lower socio-economic subjects scored higher on one of the non-verbal dimensions in both instances of covarying.

Table 9

Analysis of Covariance Summary Table

Comparison Between White Subjects at Various Socio-economic Levels on Creativity Variables Related to the *Structure of Intellect* Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Ideational Fluency	6.07^{e}	H > L	3.03^{b}	H > L
Word Fluency	2.95^{b}	H > L	.46	——
Associational Fluency	3.75^{c}	H L	1.60	——
Unusual Uses Fluency	1.43	——	1.38	——
Unusual Uses Shifts	2.60^{a}	H > L	1.54	——
Consequences Obvious	3.39^{c}	H L	4.14^{d}	H > L
Consequences Remote	.22	——	.04	——
Making Objects	2.50^{a}	L > H	2.79^{b}	L > H
Seeing Problems	5.35^{e}	H > L	1.80	——
Circles Fluency	2.65^{b}	L > H	2.08^{a}	L > H
Circles Shifts	3.02^{b}	L > H	2.54^{a}	L > H
Circles Originality	5.34^{e}	L > H	4.34^{e}	L > H
Circles Elaboration	4.64^{e}	L > H	4.64^{e}	L > H

a = $p < .10$ with 3 and 235 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 10

Analysis of Covariance Summary Table

Comparison Between White Subjects at Various Socio-economic Levels on "Creativity Variables" Not Directly Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Consequences Shifts	3.32^c	H > L	2.04	——
Consequences Fluency	2.23^a	H > L	2.56^a	H > L
Consequences Breadth	2.90^b	H > L	1.46	——
Consequences Total Score	2.84^b	H > L	2.51^a	H > L
Unusual Uses Breadth	1.02	——	.79	——
Unusual Uses Total Score	1.19	——	1.10	——
Circles Breadth	.99	——	.96	——
Circles Total Score	6.11^e	L > H	5.52^e	L > H
Creativity Total Score	2.21^a	H > L	.97	——

a=$p < .10$ with 3 and 235 df
b=$p < .05$
c=$p < .025$
d=$p < .01$
e=$p < .005$

Socio-economic Comparisons (Negro Subjects)

Tables 11 and 12 show the results of the analysis of covariance procedure for the Negro subjects on each of the dependent variables. The mean values for the subjects on these variables appear in Appendix B. It is of interest to note that none of the 44 individual analyses indicates a significant difference between subjects at the various socio-economic levels on the dependent variables. This is significant particularly since a number of differences between the various socio-economic levels were noticed with the white subjects, and of especial interest in light of the fact that both groups were assigned to socio-economic levels using the same criteria.

Table 11

Analysis of Covariance Summary Table

Comparison Between Negro Subjects at Various Socio-economic Levels on Creativity Variables Related to the *Structure of Intellect* Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Ideational Fluency	.72	—	.76	—
Word Fluency	.54	—	.58	—
Associational Fluency	1.13	—	1.69	—
Unusual Uses Fluency	.76	—	.66	—
Unusual Uses Shifts	.76	—	.55	—
Consequences Obvious	1.48	—	1.00	—
Consequences Remote	.82	—	.67	—
Making Objects	.05	—	.13	—
Seeing Problems	.44	—	.56	—
Circles Fluency	.89	—	.91	—
Circles Shifts	.62	—	.62	—
Circles Originality	.44	—	.35	—
Circles Elaboration	.17	—	.18	—

Table 12

Analysis of Covariance Summary Table

Comparison Between Negro Subjects at Various Socio-economic Levels
on "Creativity Variables" Not Directly Related to
the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Consequences Shifts	.49	——	.27	——
Consequences Fluency	1.46	——	.97	——
Consequences Breadth	.36	——	.56	——
Consequences Total Score	.95	——	.60	——
Unusual Uses Breadth	.69	——	.52	——
Unusual Uses Total Score	1.04	——	.84	——
Circles Breadth	.54	——	.54	——
Circles Total Score	.31	——	.33	——
Creativity Total Score	1.01	——	.75	——

Socio-economic Comparisons (Male Subjects)

A 2 x 4 (race x socio-economic) analysis of covariance for each sex was done to determine the difference in the responses for males at each socio-economic level. Additionally, it was of interest to ascertain the difference between the responses of the Negro and white children. These differences will be presented in a later section of this report.

Tables 13 and 14 present information concerning differences between the four socio-economic levels on the dependent variables for the males. Of the thirteen variables, two were significant beyond the .05 level and one at the .10 level, favoring the higher socio-economic subjects with IQ covaried. The lower socio-economic subjects were significantly higher on one of the non-verbal tests when IQ was statistically controlled. A similar finding was observed when achievement was covaried.

Table 13

Analysis of Covariance Summary Table

Comparison Between Various Socio-economic Levels for Males On Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Ideational Fluency	2.60^a	H > L	1.41	——
Word Fluency	1.40	——	.46	——
Associational Fluency	4.75^e	H > L	1.64	——
Unusual Uses Fluency	.92	——	.76	——
Unusual Uses Shifts	1.22	——	.58	——
Consequences Obvious	.40	——	.50	——
Consequences Remote	.45	——	.41	——
Making Objects	.43	——	.93	——
Seeing Problems	5.87^e	H > L	2.14^a	H > L
Circles Fluency	.83	——	.54	——
Circles Shifts	.88	——	.74	——
Circles Originality	1.08	——	.60	——
Circles Elaboration	4.28^e	L > H	4.54^e	L > H

a = $p < .10$ with 3 and 277 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 14

Analysis of Covariance Summary Table

Comparison Between Various Socio-economic Levels for Males on "Creativity Variables" Not Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Consequences Shifts	1.19	——	.59	——
Consequences Fluency	.53	——	.43	——
Consequences Breadth	2.11*	H > L	.73	——
Consequences Total Score	.79	——	.51	——
Unusual Uses Breadth	.46	——	.37	——
Unusual Uses Total Score	.88	——	.69	——
Circles Breadth	.03	——	.06	——
Circles Total Score	1.97	——	2.00	——
Creativity Total Score	.80	——	.53	——

* $p < .10$ with 3 and 277 df

Socio-economic Comparisons (Female Subjects)

The same statistical procedure as was performed with the males was done using all of the females to determine differences at each socio-economic level. Tables 15 and 16 enumerate the results of this analysis. It is interesting to observe that essentially no differences were exhibited between socio-economic levels with the females, with the possible exception of a slight trend, at the .10 level, on the non-verbal originality dimension.

Table 15

Analysis of Covariance Summary Table

Comparison Between Various Socio-economic Levels for Females
On Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Ideational Fluency	.70	—	1.58	—
Word Fluency	.39	—	1.49	—
Assoctional Fluency	1.90	—	*	—
Unusual Uses Fluency	.10	—	.09	—
Unusual Uses Shifts	.12	—	*	—
Consequences Obvious	.59	—	.55	—
Consequences Remote	.32	—	*	—
Making Objects	.26	—	.34	—
Seeing Problems	*	—	*	—
Circles Fluency	1.69	—	1.56	—
Circles Shifts	.33			
Circles Originality	2.48^a	L > H	2.12^a	L > H
Circles Elaboration	.12	—	.28	—

a=p < .10

*Regression test significant at .01 level

Table 16

Analysis of Covariance Summary Table

Comparison Between Various Socio-economic Levels for Females on "Creativity Variables" Not Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Consequences Shifts	.65	——	1.18	——
Consequences Fluency	.22	——	.19	——
Consequences Breadth	.77	——	*	——
Consequences Total Score	.18	——	.25	——
Unusual Uses Breadth	*	——	*	——
Unusual Uses Total Score	.03	——	*	——
Circles Breadth	.57	——	.44	——
Circles Total Score	.33	——	.38	——
Creativity Total Score	.04	——	.20	——

*Regression test significant at .01 level

2

Socio-economic Comparisons (Races Combined)

Since the white and Negro subjects under study were assigned to socio-economic levels using the same criteria, it was decided to combine the races in a two-way analysis of covariance (sex x socio-economic) on all of the dependent variables, covarying IQ and achievement separately. The results of this analysis are reported in Tables 17 and 18.

These tables reveal that, with IQ covaried, nine of the creativity variables are significant beyond the .10 level of significance, with seven of them at or beyond the .05 level, when IQ was covaried. Lower socio-economic subjects were higher on the circles elaboration factor, with the higher socio-economic children showing a superior performance on the other variables of significance. Generally, the findings were similar when achievement was covaried.

It is interesting to compare the results reported in Tables 9 and 10 with the results shown in Tables 17 and 18. Since no differences between socio-economic levels were noted when Negro subjects were analyzed as a group, combining the races in this analysis yielded fewer differences.

Table 17

Analysis of Covariance Summary Table

Comparison Between Various Socio-economic Levels for Combined Races on Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Ideational Fluency	4.86^e	H > L	2.43^a	H > L
Word Fluency	3.42^c	H > L	2.13^a	H > L
Associational Fluency	11.19^e	H > L	2.75^b	H > L
Unusual Uses Fluency	.67	——	.76	——
Unusual Uses Shifts	1.76	——	.12	——
Consequences Obvious	1.27	——	2.10^a	H > L
Consequences Remote	.94	——	.13	——
Making Objects	2.39^a	H > L	1.32	——
Seeing Problems	10.37^e	H > L	1.79	——
Circles Fluency	.11	——	.26	——
Circles Shifts	.74	——	.86	——
Circles Originality	.14	——	.24	——
Circles Elaboration	2.63^b	L > H	2.50^a	L > H

a = $p < .10$ with 3 and 593 df.
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 18

Analysis of Covariance Summary Table

Comparison Between Various Socio-economic Levels for Combined Races on "Creativity Variables" Not Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (H=higher) (L=lower)	F Value (Ach. Covaried)	Direction (H=higher) (L=lower)
Consequences Shifts	2.92^b	$H > L$	1.44	——
Consequences Fluency	1.54	——	1.53	——
Consequences Breadth	4.53^e	$H > L$	.96	——
Consequences Total Score	2.58^a	$H > L$	1.68	——
Unusual Uses Breadth	.23	——	.65	——
Unusual Uses Total Score	.38	——	.48	——
Circles Breadth	.97	——	.90	——

$a = p < .10$ with 3 and 593 df
$b = p < .05$
$c = p < .025$
$d = p < .01$
$e = p < .005$

Entrepreneural-Bureaucratic Comparisons

A 2 x 2 (sex x group) analysis of variance procedure was done on the subjects associated with families identified as either entrepreneural or bureaucratic. This test was chosen since differences did not exist between the groups on either achievement or intelligence. Prior to the use of this procedure, a test for homogeneity of variance indicated that no significant differences existed on any of the dependent variables.

The mean values on each of the dependent variables for entrepreneural and bureaucratic males and females appear in Appendix B. Table 19 summarizes the analysis of variance values for all of the dependent variables in terms of group differences, male - female differences, and their interaction.

It will be noticed on the basis of the comparisons between the entrepreneural and bureaucratic groups that the hypothesis is not supported. In fact, one would expect to find one significant difference by chance alone. There were four variables on which a sex difference was observed. On the ideational, word, and associational fluency tests, the females exceeded the males. However, when all scores were totaled into a total creativity score, the males were significantly superior to the females. This is a particularly perplexing finding since in other analyses there were either no differences between the responses of boys and girls or, when differences were seen, they were in the opposite directions. This suggests perhaps that these subjects did constitute, in fact, a sample of a unique population of subjects.

One variable on the interaction analysis showed a significant difference. In this case the bureaucratic females had the highest score, with the bureaucratic males showing the lowest performance. Caution should be exercised in interpreting this finding since the Unusual Uses Breadth score has not been directly related to either the _Structure of Intellect_ Model or to a theoretical position. This may have been a chance finding.

Table 19

Analysis of Variance Summary Table

Comparisons Between Entrepreneural and Bureaucratic,

Male and Female Subjects on all Creativity Variables

Creativity Variables	F	Entrepreneural or Bureaucratic	F	Male or Female	F	Interaction
Ideational Fluency	1.78	—	8.00^{c}	F > M	.04	—
Word Fluency	.01	—	4.39^{a}	F > M	.28	—
Associational Fluency	.51	—	7.82^{c}	F > M	.02	—
Unusual Uses Fluency	.03	—	2.58	—	1.79	—
Unusual Uses Shifts	.03	—	.38	—	3.19	—
Consequences Obvious	.05	—	2.14	—	.31	—
Consequences Remote	.05	—	.04	—	.97	—
Making Objects	.01	—	2.43	—	.03	—
Seeing Problems	.58	—	1.28	—	.04	—
Circles Fluency	.05	—	.62	—	.80	—
Circles Shifts	1.22	—	1.22	—	.15	—
Circles Originality	.63	—	.07	—	.34	—
Circles Elaboration	1.10	—	1.19	—	3.11	—
Consequences Shifts	.74	—	2.31	—	.96	—
Consequences Fluency	.04	—	1.92	—	.06	—
Consequences Breadth	.44	—	.92	—	.44	—
Consequences Total Score	.09	—	2.32	—	.91	—
Unusual Uses Breadth	.29	—	.06	—	6.16^{b}	BF > BM
Unusual Uses Total Score	.03	—	1.23	—	3.24	—
Circles Breadth	1.50	—	.32	—	.06	—
Circles Total Score	.86	—	.71	—	1.00	—
Creativity Total Score	.27	—	6.61^{b}	M > F	.06	—

a=$p < .05$ with 1 and 68 df
b=$p < .025$
c=$p < .01$
d=$p < .005$

RESULTS OF SUPPLEMENTARY ANALYSES

This chapter reports the results of various supplementary analyses on the data which were collected. Included in this section are results related to sex and race differences, an analysis of a sub-sample of intellectually gifted and intellectually retarded children, and a summary of several factor analysis procedures on scores of various groups within the study.

Comparisons Between Males and Females (White Subjects)

Scores on the white, male and female subjects on the dependent variables were analyzed using a 2 x 4 (sex x socio-economic level) analysis of covariance procedure for white subjects alone. The results of this analysis are presented in Table 20.

On four of the thirteen creativity variables in which IQ was covaried, females were significantly superior to males beyond the .05 level. On one other variable, the difference was at the .10 level in favor of the females. When achievement was covaried, similar findings were evidenced with an additional factor being significant at the .10 level. Interestingly enough, all the factors showing significance were in the verbal areas.

Table 21 reports on those creativity factors not directly associated with the *Structure of Intellect* model. Here the females exceeded the males at less than the .025 level on five of the nine variables both when IQ was covaried as well as when achievement was controlled. Again, the differences were in terms of verbal factors, with none being in the areas typically considered to be evaluating non-verbal creativity.

Table 20

Analysis of Covariance Summary Table

Comparison Between White, Male and Female Subjects
on Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (F=female) (M=male)	F Value (Ach. Covaried)	Direction (F=female) (M=male)
Ideational Fluency	5.05^c	F > M	4.98^b	F > M
Word Fluency	3.40^a	F > M	3.47^a	F > M
Associational Fluency	4.49^b	F > M	4.68^b	F > M
Unusual Uses Fluency	.04	——	.03	——
Unusual Uses Shifts	2.66	——	2.71^a	F > M
Consequences Obvious	5.57^c	F > M	5.91^c	F > M
Consequences Remote	7.58^d	F > M	7.93^e	F > M
Making Objects	.29	——	.30	——
Seeing Problems	1.42	——	1.28	——
Circles Fluency	.01	——	.002	——
Circles Shifts	.01	——	.06	——
Circles Originality	.01	——	.00001	——
Circles Elaboration	.01	——	.01	——

a = $p < .10$ with 1 and 235 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 21

Analysis of Covariance Summary Table

Comparison Between White, Male and Female Subjects on the "Creativity Variables" Not Directly Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (F=female) (M=male)	F Value (Ach. Covaried)	Direction (F=female) (M=male)
Consequences Shifts	7.97^{e}	F > M	8.14^{e}	F > M
Consequences Fluency	10.74^{e}	F > M	11.21^{e}	F > M
Consequences Breadth	5.64^{c}	F > M	5.78^{c}	F > M
Consequences Total Score	10.74^{e}	F > M	11.07^{e}	F > M
Unusual Uses Breadth	.004	——	.0001	——
Unusual Uses Total Score	.03	——	.02	——
Circles Breadth	.26	——	.39	——
Circles Total Score	.40	——	.53	——
Creativity Total Score	6.32^{c}	F > M	6.45^{c}	F > M

a = $p < .10$ with 1 and 235 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Comparisons Between Males and Females (Negro Subjects)

Creativity scores on the Negro, male and female subjects, were analyzed using the same procedure as was done with the white, male and females. The results of this analysis are presented in Tables 22 and 23.

It is interesting to note that a significant difference was seen between the males and females on only one creativity variable: Seeing Problems. In this case the difference was favoring the males at the .05 level both when IQ as well as achievement was covaried. This contrasts sharply with the findings between the sexes for the white subjects.

Table 22

Analysis of Covariance Summary Table

Comparison Between Negro, Male and Female Subjects
on Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (F=female) (M=male)	F Value (Ach. Covaried)	Direction (F=female) (M=male)
Ideational Fluency	1.61	——	2.01	——
Word Fluency	1.15	——	1.55	——
Associational Fluency	.34	——	.48	——
Unusual Uses Fluency	.23	——	.30	——
Unusual Uses Shifts	.24	——	.36	——
Consequences Obvious	.11	——	.21	——
Consequences Remote	.15	——	1.58	——
Making Objects	.06	——	.13	——
Seeing Problems	4.74*	M > F	4.14*	M > F
Circles Shifts	.75	——	.78	——
Circles Fluency	.83	——	.86	——
Circles Originality	.37	——	.41	——
Circles Elaboration	.74	——	.70	——

$^*p < .05$ with 1 and 351 df

Table 23

Analysis of Covariance Summary Table

Comparison Between Negro, Male and Female Subjects
on the "Creativity Variables" Not Directly Related
to the Structure of Intellect Model

Creativity Variable	F Value (IQ Covaried)	Direction (F=female) (M=male)	F Value (Ach. Covaried)	Direction (F=female) (M=male)
Consequences Shifts	.87	——	1.13	——
Consequences Fluency	.45	——	.62	——
Consequences Breadth	.23	——	.35	——
Consequences Total Score	.77	——	.95	——
Unusual Uses Breadth	.001	——	.02	——
Unusual Uses Total Score	.05	——	.10	——
Circles Breadth	.41	——	.48	——
Circles Total Score	.40	——	.41	——
Creativity Total Score	.54	——	.76	——

with 1 and 351 df

Comparisons Between Males and Females (Races Combined)

A 2 x 4 (sex x socio-economic) analysis of covariance on all of the dependent variables was done controlling for IQ and achievement separately. In this analysis both the Negro and white subjects were combined. Tables 24 and 25 report the findings. It will be noticed that on 11 of the 20 variables (two of the total scores were not used in this analysis) in which IQ was controlled, females were superior to the males on all dependent variables (except a non-verbal variable) at less than the .025 level. The same findings were observed when achievement was controlled.

A comparison of the results in Tables 20 and 21 with those in Tables 24 and 25 indicates that adding the Negro subjects in a total analysis increased slightly the number of variables on which significance was found. When the subjects were combined in this analysis, the F values were more highly significant. It is interesting to notice that females were consistently higher on factors related to verbal fluency, flexibility, and originality. The differences were not obvious in the evaluative and non-verbal areas of creative thought.

Table 24

Analysis of Covariance Summary Table

Comparison Between the Combined Negro and White, Male and Female Subjects, on the Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (F=female) (M=male)	F Value (Ach. Covaried)	Direction (F=female) (M=male)
Ideational Fluency	15.05[e]	F > M	17.10[e]	F > M
Word Fluency	6.18[e]	F > M	7.98[e]	F > M
Associational Fluency	9.70[e]	F > M	11.46[e]	F > M
Unusual Uses Fluency	.05	——	.02	——
Unusual Uses Shifts	3.97[d]	F > M	4.81[e]	F > M
Consequences Obvious	5.22[e]	F > M	6.11[e]	F > M
Consequences Remote	3.72[e]	F > M	4.35[e]	F > M
Making Objects	.81	——	1.13	——
Seeing Problems	.03	——	.02	——
Circles Fluency	.07	——	.15	——
Circles Shifts	1.48	——	1.91	——
Circles Originality	.11	——	.03	——
Circles Elaboration	2.41[a]	F > M	2.07[a]	F > M

a = $p < .10$ with 1 and 593 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 25

Analysis of Covariance Summary Table

Comparison Between the Combined Negro and White, Male and Female Subjects on the "Creativity Variables" Not Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (F=female) (M=male)	F Value (Ach. Covaried)	Direction (F=female) (M=male)
Consequences Shifts	8.99^{e}	F > M	10.39^{e}	F > M
Consequences Fluency	7.23^{e}	F > M	8.28^{e}	F > M
Consequences Breadth	3.45^{c}	F > M	4.22^{d}	F > M
Consequences Total Score	8.27^{e}	F > M	9.48^{e}	F > M
Unusual Uses Breadth	.06	——	.07	——
Unusual Uses Total Score	.02	——	.05	——
Circles Breadth	.25	——	.44	——

a = $p < .10$ with 1 and 593 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Comparisons Between Negro and White Subjects

A 2 x 4 (race x socio-economic) analysis of covariance, controlling separately for intelligence and achievement, was done on all of the dependent variables. Tables 26 and 27 present the results of this analysis. With IQ controlled, 17 of the 20 dependent variables were significantly different, favoring the white subjects. Two of the dependent variables showed a significant regression test, precluding the interpretation of the F values. Differences between the groups were noticed in both the verbal and non-verbal areas. When achievement was controlled, 10 of the 20 factors showed significant regression values, indicating that a basic assumption could not be met. On those variables on which this assumption could be met and on which differences were observed, the white subjects were significantly superior to the Negro children. Again, these differences were noted in both verbal and non-verbal areas of functioning. In most instances where differences were seen, the level of significance was beyond the .005 level.

Table 26

Analysis of Covariance Summary Table

Comparison Between White and Negro Subjects on the Creativity Variables Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (W=white) (N=Negro)	F Value (Ach. Covaried)	Direction (W=white) (N=Negro)
Ideational Fluency	2.51[a]	W > N	*	——
Word Fluency	1.63	——	*	——
Associational Fluency	12.95[e]	W > N	*	——
Unusual Uses Fluency	*	——	*	——
Unusual Uses Shifts	14.99[e]	W > N	*	——
Consequences Obvious	16.71[e]	W > N	26.92[e]	W > N
Consequences Remote	8.34[e]	W > N	*	——
Making Objects	17.08[e]	W > N	*	——
Seeing Problems	25.64[e]	W > N	*	——
Circles Fluency	15.00[e]	W > N	18.05[e]	W > N
Circles Shifts	4.26[e]	W > N	8.14[e]	W > N
Circles Originality	18.60[e]	W > N	22.22[e]	W > N
Circles Elaboration	3.54[c]	W > N	2.68[b]	W > N

a = $p < .10$ with 1 and 597 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

* Regression test significant beyond .01 level

Table 27

Analysis of Covariance Summary Table

Comparison Between White and Negro Subjects
on the "Creativity Variables" Not Related
to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (W=white) (N=Negro)	F Value (Ach. Covaried)	Direction (W=white) (N=Negro)
Consequences Shifts	10.46^e	W > N	*	——
Consequences Fluency	20.81^e	W > N	35.38^e	W > N
Consequences Breadth	15.65^e	W > N	*	——
Consequences Total Score	17.88^e	W > N	32.51^e	W > N
Unusual Uses Breadth	9.80^e	W > N	*	——
Unusual Uses Total Score	10.73^e	W > N	18.82^e	W > N
Circles Breadth	*	——	.24	——

a = $p < .10$ with 1 and 597 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

* Regression test significant beyond .01 level

Comparisons Between Negro and White, Male Subjects

In order to determine more specifically the extent of the differences between Negro and white students, a separate analysis was done on male subjects. The analysis of covariance procedure was used, again controlling for intelligence and achievement. Tables 28 and 29 present these results. When IQ was controlled, white males showed a significantly superior performance on 6 of the 20 dependent variables when compared with Negro males. It is particularly interesting to observe that none of the differences were on verbal items. The same findings were observed when achievement was covaried. The white male subjects exceeded the Negro male children on 6 of the 20 creativity variables. Here again, the differences were noticed on non-verbal variables.

When one compares the differences between the results on Tables 28 and 29 with those recorded on Tables 26 and 27, it is astonishing to notice the wide discrepancies in the number of variables reaching significance. Obviously, then, the Negro males are contributing less than the females to the large differences seen between the total Negro group and the total white group.

Table 28

Analysis of Covariance Summary Table

Comparison Between Negro and White, Male Subjects
on the Creativity Variables Related
to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (W=white) (N=negro)	F Value (Ach. Covaried)	Direction (W=white) (N=Negro)
Ideational Fluency	.02	——	.26	——
Word Fluency	.02	——	.23	——
Associational Fluency	.55	——	.10	——
Unusual Uses Fluency	1.64	——	1.81	——
Unusual Uses Shifts	2.41	——	2.16	——
Consequences Obvious	.37	——	.71	——
Consequences Remote	.68	——	.49	——
Making Objects	6.05^c	W > N	5.68^c	W > N
Seeing Problems	.17	——	.03	——
Circles Fluency	8.35^e	W > N	9.45^e	W > N
Circles Shifts	8.15^e	W > N	9.44^e	W > N
Circles Originality	14.27	W > N	16.21^e	W > N
Circles Elaboration	1.62	——	1.11	——

$a = p < .10$ with 1 and 277 df
$b = p < .05$
$c = p < .025$
$d = p < .01$
$e = p < .005$

Table 29

Analysis of Covariance Summary Table

Comparison Between Negro and White, Male Subjects
on the "Creativity Variables" Not Related
to the *Structure of Intellect* Model

Creativity Variables	F Value (IQ Covaried)	Direction (W=white) (N=Negro)	F Value (Ach. Covaried)	Direction (W=white) (N=Negro)
Consequences Shifts	.06	——	.02	——
Consequences Fluency	.57	——	.82	——
Consequences Breadth	.28	——	.03	——
Consequences Total Score	.36	——	.39	——
Unusual Uses Breadth	2.20	——	1.96	——
Unusual Uses Total Score	1.40	——	1.51	——
Circles Breadth	.37	——	.64	——
Circles Total Score	7.31[d]	W > N	7.93[e]	W > N
Creativity Total Score	3.13[a]	W > N	2.89[a]	W > N

a = $p < .10$ with 1 and 277 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Comparisons Between Negro and White, Female Subjects

In order to ascertain the extent to which the female Negro and white subjects differed, an analysis similar to the one done for the males was completed. Tables 30 and 31 report the results of this analysis. As was expected, the females differed considerably from the males in the number of variables significant. Fourteen of the twenty creativity variables favored the white female subjects. Whereas the males'differences were noticed on non-verbal items, females tended to show discrepancies on the verbal items, although three of the seven non-verbal items were different for the white and Negro female subjects. When achievement was controlled, findings similar to those found when IQ was covaried were observed. In addition, it was interesting to note that the females contributed the greatest to whether the regression test was significant when the sexes were combined. For the males alone, none of the variables produced a significant regression value.

Table 30

Analysis of Covariance Summary Table

Comparison Between Negro and White, Female Subjects
on the Creativity Variables Related
to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (W=white) (N=Negro)	F Value (Ach. Covaried)	Direction (W=white) (N=Negro)
Ideational Fluency	.97	——	1.89	——
Word Fluency	1.06	——	2.69	——
Associational Fluency	7.13[d]	W > N	*	——
Unusual Uses Fluency	7.12[d]	W > N	7.37[d]	W > N
Unusual Uses Shifts	9.66[e]	W > N	*	——
Consequences Obvious	12.36[e]	W > N	12.08[e]	W > N
Consequences Remote	7.77[d]	W > N	*	——
Making Objects	10.47[e]	W > N	12.13[e]	W > N
Seeing Problems	*	——	*	——
Circles Fluency	9.45[e]	W > N	10.35[e]	W > N
Circles Shifts	1.02	——	1.23	——
Circles Originality	8.79[e]	W > N	10.38[e]	W > N
Circles Elaboration	2.25	——	1.38	——

a = $p < .10$ with 1 and 307 df
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

* Regression test significant at .01 level

Table 31

Analysis of Covariance Summary Table

Comparison Between Negro and White, Female Subjects on the "Creativity Variables" Not Related to the Structure of Intellect Model

Creativity Variables	F Value (IQ Covaried)	Direction (W=white) (N=Negro)	F Value (Ach. Covaried)	Direction (W=white) (N=Negro)
Consequences Shifts	7.73[d]	W > N	9.75	W > N
Consequences Fluency	18.67[e]	W > N	19.44[e]	W > N
Consequences Breadth	9.11[e]	W > N	*	——
Consequences Total Score	11.82[e]	W > N	12.94[e]	W > N
Unusual Uses Breadth	*	——	*	——
Unusual Uses Total Score	11.60	W > N	*	——
Circles Breadth	.13	——	.35	——
Circles Total Score	1.55	——	1.52	——
Creativity Total Score	16.06[e]	W > N	19.21[e]	W > N

$a = p < .10$ with 1 and 307 df
$b = p < .05$
$c = p < .025$
$d = p < .01$
$e = p < .005$

* Regression test significant at .01 level

Comparison of Intellectually Gifted Subjects with Intellectually Normal

As a supplement to the major analysis, all of the subjects who had scored above 120 on the Kuhlmann-Anderson Intelligence Test were matched with an intellectually normal child (IQ between 90 and 120) on the basis of sex, race, socio-economic situation, and according to the school and classroom. There were a total of 60 subjects (26 males and 34 females) who had scored with an IQ above 120.

The primary objective of this supplementary analysis with the gifted children was to determine on which of the creativity factors gifted children differed from intellectually normal children when different variables of possible influence were controlled. In addition, we were interested in observing the manner and degree to which the statistical values changed as different variables were covaried.

Pearson Product-Moment correlations were computed between IQ, achievement, mental age, chronological age, and all of the creativity variables. Although this was revealing in terms of shared variance between the creativity scores and other variables, it did not make dramatic the degree to which differences between the two groups occurred when the variables singly, and in various combinations, were covaried. Thus, an analysis of variance and analyses of covariance controlling individually IQ, achievement, mental age, and chronological age, were performed on each of the creativity variables. Two additional analyses of covariance procedures were done, one controlling IQ, achievement, chronological age, and mental age. Each of these procedures involved a 2 x 2 (sex x group) analysis. It was then possible to ascertain differences between the two groups, both sexes, and their interaction on each of the analyses on every variable.

Prior to the processing of the data, it seemed reasonable to expect the gifted children to exceed their normal controls on the great majority of creativity variables, particularly those involving verbal responses. Further, from other studies, it was hypothesized that females would be substantially superior to males in their creativity responses. If any interaction occurred, it was speculated that it would always favor the gifted females, with the normal males being the lowest of the four groups. Table 32 summarizes the F values for each of the various statistical tests on every dependent variable between the gifted and normal subjects.

Using the analysis of variance procedure, the intellectually gifted exceeded the normal subjects on eight of the fourteen verbal creativity variables at or beyond the .05 level of significance. None of the seven non-verbal factors nor the evaluative factor (Seeing Problems) yielded a significant group difference. Controlling for intelligence erased all of these differences except the trend at the .10 level related to the total creativity score. This is consistent with the rather high correlations observed between the intelligence and those creativity factors seen to be significant. However, differences favoring the gifted children were seen on two other creativity variables, one at the .025 level related to Sensitivity to Problems, and the other at the .10 level related to Ideational Fluency. Interestingly, the normals exceeded the gifted subjects at the .05 level on one variable, the Obvious Consequences score, which has been identified as the divergent production of semantic units.

When achievement was covaried, the gifted children were significantly superior to the normals at the .005 level on the Sensitivity to Problems factor. The normals exceeded the gifted subjects at the .10 level on the Obvious Consequences score.

Controlling for mental age alone wiped out all differences except for a trend at the .10 level favoring the gifted children on the Sensitivity to Problems dimension.

When chronological age was controlled alone, 6 of 22 variables (all verbal) favored the gifted children at or beyond the .10 level in three cases, and at less than the .05 level in the other three instances.

When intelligence, achievement, and chronological age were covaried together, as well as when mental age was added, the only variable on which any differences occurred was on the Obvious Consequences score at the .10 level, favoring the normal subjects.

Since the literature is clear in reporting differences between males and females, we expected to observe these 5th grade females significantly superior to the males in creative thinking abilities. Table 33 provides the results of the various analyses between the sexes on the dependent variables.

A total of 154 separate analyses were performed on the males and females in the course of the data processing. Four of the analyses were significant at the .10 level and one at the .05 level. By chance, we would expect at least seven significant differences to occur. Four of the analyses showed differences favoring the males, all on the Sensitivity to Problems factor. The other difference favored the females on the Word Fluency factor at the .10 level.

Seventeen of the 154 separate analyses related to interaction were significant. Table 34 presents these findings. Twelve of the seventeen scores were in the areas directly related to non-verbal creative thought, i.e., in the areas related to the divergent production of figural products. In the area of non-verbal flexibility, the gifted females were consistently superior to all other groups irrespective of the variable statistically controlled. The gifted males were the lowest of the four groups on this factor. In non-verbal fluency, the normal males were consistently superior irrespective of the statistical control used, followed by the gifted females, normal females, and the gifted males. The remaining variables on which differences were noted were significant at the .10 level.

Table 32

Comparisons Between Intellectually Gifted and Normal Subjects
On the Creativity Variables Using Analysis of Variance
and Analyses of Covariance Procedures

Creativity Variables	ANOV	ANOCV (IQ)	ANOCV (CA)	ANOCV (Ach.)	ANOCV (MA)	ANOCV (IQ,CA) (Ach.)	ANOCV (IQ,CA) (MA,Ach.)
Ideational Fluency	8.68^e	1.89	3.30^a	.75	.01	.12	.13
Word Fluency	16.52^e	.20	9.49^e	.09	.92	.01	.09
Associational Fluency	10.32^e	2.71	3.73^a	.19	.08	.70	1.14
Making Objects	2.68	2.31	2.40	.30	1.43	.41	1.12
Seeing Problems	1.47	5.22^c	.08	8.32^e	3.13^a	.30	1.52
Consequences Flexibility	5.10^b	.30	2.87^a	.19	.01	.06	.06
Consequences Fluency	.39	2.50	.11	1.57	.66	1.39	1.46
Consequences Obvious	.04	4.31^b	1.38	2.88^a	1.28	3.63^a	3.03^a
Consequences Remote	6.45^c	.34	4.31^b	.43	.25	2.03	.82
Consequences Breadth	4.72^b	.34	2.08	.11	.11	.19	.06
Consequences Total Score	1.97	1.52	.24	.92	.12	.82	.73
Unusual Uses Fluency	.54	3.11^a	.02	1.22	1.25	1.59	2.13
Unusual Uses Flexibility	3.92^b	.48	2.33	.13	.01	.01	.01
Unusual Uses Breadth	8.69^e	.11	5.72^c	.11	.97	.08	.29
Unusual Uses Total Score	2.32	2.27	.71	.59	.26	.61	.79
Circles Fluency	.26	.63	.23	1.34	.65	1.12	.94
Circles Flexibility	.07	.44	.01	.51	.01	.26	.11
Circles Breadth	1.72	.01	1.43	.01	.53	.16	.37
Circles Originality	.01	.42	.50	.17	.02	.96	.66
Circles Elaboration	.42	.96	.22	.44	.41	.16	.22
Circles Total Score	.14	.09	.01	.18	.01	.25	.11
CREATIVITY TOTAL SCORE	4.90^b	3.03^a	1.42	1.53	.28	.96	1.08
Degrees of Freedom	1/116	1/115	1/115	1/115	1/115	1/113	1/112

a = $p < .10$ with appropriate degrees of freedom
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 33

Comparisons Between Male and Female Subjects on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures

Creativity Variables	ANOV	ANOCV (IQ)	ANOCV (CA)	ANOCV (Ach.)	ANOCV (MA)	ANOCV (IQ,CA) (Ach.)	ANOCV (IQ,CA) (MA,Ach.)
Ideational Fluency	.17	.31	.26	.13	.02	.22	.21
Word Fluency	2.10	2.74^a	2.35	2.68	1.52	2.53	2.67
Associational Fluency	.24	.46	.38	.22	.03	.25	.19
Making Objects	.11	.06	.11	.19	.43	.29	.39
Seeing Problems	2.27	2.19	2.07	4.02^b	3.74^a	3.28^a	3.89^a
Consequences Flexibility	.93	1.11	1.00	.93	.60	.87	.85
Consequences Fluency	.04	.09	.09	.03	.01	.06	.05
Consequences Obvious	.01	.01	.01	.01	.02	.01	.01
Consequences Remote	.56	.61	.60	.52	.34	.66	.53
Consequences Breadth	1.86	2.13	2.03	1.92	1.47	1.82	1.89
Consequences Total Score	.41	.54	.54	.37	.22	.43	.42
Unusual Uses Fluency	.10	.16	.14	.07	.01	.06	.04
Unusual Uses Flexibility	.31	.40	.34	.27	.14	.27	.24
Unusual Uses Breadth	.01	.01	.01	.01	.01	.01	.01
Unusual Uses Total Score	.22	.32	.27	.18	.07	.17	.14
Circles Fluency	.06	.06	.06	.05	.04	.03	.03
Circles Flexibility	1.47	1.52	1.49	1.42	1.36	1.34	1.39
Circles Breadth	.37	.40	.36	.34	.33	.32	.37
Circles Originality	.59	.63	.73	.57	.56	.62	.65
Circles Elaboration	.66	.62	.67	.65	.68	.66	.68
Circles Total Score	.82	.85	.88	.79	.76	.77	.81
CREATIVITY TOTAL SCORE	.35	.56	.48	.33	.11	.38	.35
Degrees of Freedom	1/116	1/115	1/115	1/115	1/115	1/113	1/112

a = $p < .10$ with appropriate degrees of freedom
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Table 34

Interaction Effects Between Gifted and Normal, Male and Female Subjects on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures

Creativity Variables	ANOV	ANOCV (IQ)	ANOCV (CA)	ANOCV (Ach.)	ANOCV (MA)	ANOCV (IQ,CA) (Ach.)	ANOCV (IQ,CA) (MA,Ach.)
Ideational Fluency	.42	.46	.10	.74	1.72	1.22	1.22
Word Fluency	.02	.03	.15	.08	.23	.38	.30
Associational Fluency	.01	.07	.13	.11	.73	.33	.41
Making Objects	3.57^a	.40	3.39^a	.42	1.50	1.40	1.14
Seeing Problems	.04	.15	.01	.35	1.00	.01	.08
Consequences Flexibility	.97	.41	.70	.57	2.18	2.25	2.23
Consequences Fluency	.04	.05	.01	.06	.33	.05	.06
Consequences Obvious	.04	.01	.31	.01	.01	.03	.04
Consequences Remote	1.42	.58	1.18	.73	2.53	1.31	1.58
Consequences Breadth	.60	.29	.32	.39	1.30	1.43	1.32
Consequences Total Score	.28	.14	.05	.19	.87	.53	.52
Unusual Uses Fluency	1.17	.34	.77	.34	2.47	1.97	2.14
Unusual Uses Flexibility	2.48	1.15	2.10	1.36	3.98^b	3.63^a	3.69^a
Unusual Uses Breadth	.10	.10	.04	.16	.45	.75	.63
Unusual Uses Total Score	1.77	.59	1.25	.63	3.29^a	2.85^a	2.94^a
Circles Fluency	4.89^b	.83	4.73^b	.87	5.24^c	5.61^c	5.50^c
Circles Flexibility	3.93^a	1.42	3.61^a	1.49	4.11^b	4.25^b	4.05^b
Circles Breadth	1.62	.47	1.57	.54	1.72	2.01	1.82
Circles Originality	.63	.15	.28	.15	.67	.47	.43
Circles Elaboration	.85	.16	.90	.14	.90	.86	.89
Circles Total Score	1.43	.52	1.14	.57	1.53	1.52	1.40
CREATIVITY TOTAL SCORE	.38	.31	.09	.45	1.63	1.19	1.24
Degrees of Freedom	1/116	1/115	1/115	1/115	1/115	1/113	1/112

$a = p < .10$ with appropriate degrees of freedom

$b = p < .05$

$c = p < .025$

$d = p < .01$

$e = p < .005$

Comparison of Intellectually Retarded Subjects with Intellectually Normal

An analysis similar to the one done with the group of intellectually superior children was conducted with 48 mentally retarded children who scored below 80 on the Kuhlmann-Anderson Intelligence Test. There were 29 males and 19 females in this group each of whom were matched with an intellectually normal child (IQ between 90 and 120) on the basis of sex, race, socio-economic circumstance, and according to the school and classroom.

The objective of this part of the investigation was to determine on which of the creativity variables the retarded children differed significantly from the normal subjects when variables of possible influence were controlled. The same analysis of variance and analyses of covariance procedures as described in the preceeding section were used with this group of subjects.

Prior to the data being processed, it was expected that the normal children would be significantly superior to the retarded children on the creativity variables, specifically those involving verbal responses. Additionally, we expected to observe differences between the males and females.

Table 35 describes the results when the retarded group was compared with the intellectually normal. When the analysis of variance was used to test for differences between the means for the retarded and normal subjects on the dependent variables, the latter group was significantly superior on 13 of the 22 factors at or beyond the .05 level of significance. None of these differences were noticed on the seven non-verbal items. Controlling for IQ, achievement, and MA in separate analyses erased all of the differences. When CA was covaried, 9 of the 22 variables significantly favored the normal subjects at or beyond the .05 level with the exception of two, these being at the .10 level. When the combination of IQ, CA, and achievement was controlled, as well as when IQ, CA, MA, and achievement was covaried, the normals exceeded the retarded on the Word Fluency factor at the .05 level. Differences were seen on none of the other variables.

A total of 154 independent analyses were done between the males and females. There were no differences between the sexes on any of the variables irrespective of which of the variables, singly or in combinations, were controlled. This is particularly astonishing in light of the large number of differences seen between the males and females in the major part of the investigation. Similarly, analysis of the interaction indicated no differences between the four groups, i.e., retarded males, retarded females, normal males, and normal females, on any of the creativity variables at or beyond the .05 level. In fact, there was only one instance when an interaction was significant beyond the .10 level, an event which might be expected by chance.

Table 35

Comparisons Between Intellectually Retarded and Normal Children on the Creativity Variables Using Analysis of Variance and Analyses of Covariance Procedures

Creativity Variables	ANOV	ANOCV (IQ)	ANOCV (CA)	ANOCV (Ach.)	ANOCV (MA)	ANOCV (IQ,CA) (Ach.)	ANOCV (IQ,CA) (MA,Ach.)
Ideational Fluency	9.03[e]	.91	4.38[b]	.24	.89	.79	.77
Word Fluency	23.38[e]	.60	18.66[e]	1.21	2.10	4.94[b]	4.91[b]
Associational Fluency	13.87[e]	.81	5.43[c]	.47	.13	.19	.20
Making Objects	.39	.19	.94	.48	.15	.01	.01
Seeing Problems	17.74[e]	.17	7.12[d]	.43	.98	.13	.13
Consequences Flexibility	6.20[c]	.05	.97	.75	.93	.01	.01
Consequences Fluency	4.78[b]	.16	1.19	.17	.22	.01	.01
Consequences Obvious	2.53	.07	.68	.01	.06	.01	.07
Consequences Remote	8.72[e]	.39	1.92	.07	.79	.01	.01
Consequences Breadth	6.34[c]	.01	.99	.01	1.47	.14	.13
Consequences Total Score	6.17[c]	.11	1.30	.02	.56	.01	.01
Unusual Uses Fluency	4.39[b]	.07	4.41[b]	.14	.01	1.18	1.18
Unusual Uses Flexibility	6.95[d]	.30	3.97[b]	.32	.06	.04	.04
Unusual Uses Breadth	1.14	.57	2.76[a]	.71	.11	.01	.01
Unusual Uses Total Score	6.47[c]	.31	5.42[c]	.26	.04	.55	.55
Circles Fluency	.38	.01	.74	.09	1.94	.01	.01
Circles Flexibility	.40	.06	1.44	.02	.46	.01	.01
Circles Breadth	1.14	.03	3.39[a]	.05	.14	.43	.42
Circles Originality	.01	.21	.09	.01	.54	.27	.27
Circles Elaboration	.90	.70	.45	.41	.66	.69	.67
Circles Total Score	.12	.71	.02	..12	.20	.03	.03
CREATIVITY TOTAL SCORE	12.63[e]	.04	.74	.03	.27	.49	.48
Degrees of Freedom	1/95	1/94	1/94	1/94	1/94	1/89	1/88

a = $p < .10$ with appropriate degrees of freedom
b = $p < .05$
c = $p < .025$
d = $p < .01$
e = $p < .005$

Summary of Factor Analysis Results

Interrelationships among the independent and dependent variables for the subjects were studied using factor analysis procedures. A principal axis factor solution was obtained using the squared multiple correlation as the communality estimate; rotation was then conducted to meet the varimax criteria. Subjects were divided into various groups, e.g., by sex or race, and a separate factor analysis performed to allow for an inspection of the similarity in the way variables were related between groups.

After analyzing each of the separate factor analysis procedures, it became obvious that the simple structure of the independent and dependent variables did not vary substantially when groups were analyzed separately by sex, or race, or socio-economic level. It was clear that the factor analysis procedure which was done on all of the subjects irrespective of sex, race, or socio-economic level could be used to describe simple structure in the most parsimonious way and could be generalized to the various possible groupings.

Because of space limitations, the factor loadings are presented for the total group of subjects. All of the loadings are not reported; instead, the material to follow summarizes only those loadings of ± 30 or more after varimax rotation had been performed.

Factor A

Variable	Rotated Factor Loading
Hollingshead Occupation	96
Occupation Classification	95
Warner Occupation	88
Source of Income Classification	82
Warner Summary	80
Equal Weights Total	74
Hollingshead Education	59
Education Classification	59
Warner Source of Income	51
Dwelling Area Classification	35
Hollingshead Total	35
Warner House Type	33
House Type Classification	30

The most obvious characteristic of this factor is that all socio-economic variables correlate substantially with each other. The scores may have a certain amount of spurious correlation between them, due to the fact that the same information was classified and quantified in different ways. It is interesting, however, to observe that the various socio-economic dimensions are related substantially to each other irrespective of the scoring technique used to quantify the data.

Factor B

Variable	Rotated Factor Loading
Achievement (Average)	94
Paragraph Meaning Achievement	82
Reading Achievement	82
Word Discrimination	79
Spelling Achievement	73
Language Achievement	73
Arithmetic Problems Achievement	71
IQ	64
Arithmetic Computation Achievement	60
Seeing Problems	46
Word Fluency	43
Associational Fluency	39
Ideational Fluency	30

The variables loading on this factor are associated predominately with general achievement. Moderate loadings on the evaluative dimension of creative thought (Seeing Problems) and on several of the fluency tests indicate that an obvious relationship exists between certain creativity variables and scores related to school achievement.

Factor C

Variable	Rotated Factor Loading
Arithmetic Computation Achievement	45
Arithmetic Problems Achievement	37

This factor and the one which follows are manifestations of specific aspects of achievement which were loaded in addition to being loaded on the general achievement factor.

Factor D

Variable	Rotated Factor Loading
Language Achievement	39

Factor E

Variable	Rotated Factor Loading
Circles Flexibility	93
Circles Breadth	90
Circles Total	84
Circles Fluency	62
Circles Originality	61
Creativity Total	42

The tests listed above describe a factor related to the general, non-verbal production of ideas. Spurious correlations between the variables may exist, since the same information was evaluated in different ways. This is particularly true on the first four variables listed above.

Factor F

Variable	Rotated Factor Loading
Circles Originality	56

Variables in Factors F and G describe specific aspects of the non-verbal production of ideas. Although the Circles Test has not been related directly to the Structure of Intellect, logically the Circles Originality score seems to be the divergent production of figural transformations and the Circles Elaboration score the divergent production of figural implications.

Factor G

Variable	Rotated Factor Loading
Circles Elaboration	86
Circles Total	41

Factor H

Variable	Rotated Factor Loading
Unusual Uses Total	96
Unusual Uses Fluency	95
Unusual Uses Breadth	64

The tests listed above describe the factor ideational fluency, or the divergent production of semantic units. Spurious relationships again are no doubt present since the composite score contains fluency and breadth scores.

Factor I

Variable	Rotated Factor Loading
Unusual Uses Flexibility	61
Unusual Uses Breadth	54

Listed above are the tests which describe the factor spontaneous flexibility, or the divergent production of semantic classes. The flexibility score is the number of shifts in classes made in consecutive responses; the breadth score is the total number of different classes used.

Factor J

Variable	Rotated Factor Loading
Consequences Fluency	95
Consequences Total	95
Consequences Obvious	93
Consequences Flexibility	83
Consequences Breadth	68
Creativity Total	68
Consequences Remote	52
Ideational Fluency	49
Unusual Uses Flexibility	45
Associational Fluency	37
Word Fluency	33

This factor is characterized by high loadings on the variables from the Consequences Test, with moderate loadings seen on the various tests of verbal fluency. The various consequences scores have been associated with factors labeled with diverse titles. There is obviously a fluency dimension interwoven into the above factor which perhaps is different than that measured by the Unusual Uses Test. With the Consequences Test, the subject must deal with remote, hypothetical situations, whereas the Unusual Uses Test deals with realities. In a sense, then, variables from the Consequences Test listed above are measuring general verbal productivity related to a remote, hypothesized circumstance. There is more of a need to "play the game" than is true with the other verbal creativity tests.

Factor K

Variable	Rotated Factor Loading
Consequences Remote	73

The factor represented by this test has most often been labeled verbal originality, or the divergent production of semantic transformations.

Factor L

Variable	Rotated Factor Loading
Consequences Breadth	47
Consequences Flexibility	37

The tests listed above are in some ways similar to the flexibility scores derived from the Unusual Uses Test. These scores have not been related to the Structure of Intellect; however, one might reasonably identify this factor as flexibility involving remote, hypothesized situations.

Factor M

Variable	Rotated Factor Loading
Making Objects	41

The test identifying this factor is one initially used by Guilford to evaluate the divergent production of figural systems. It has been identified previously in factor analytic studies.

Factor N

Variable	Rotated Factor Loading
Word Fluency	41
Spelling Achievement	40

Tests associated with the above factor show the relationship between a specific type of creative production, viz., verbal fluency, and a certain area of achievement. It is unusual that other verbal fluency variables are not significantly related to spelling achievement.

Interaction Effects

Significant interaction effects were observed only in those instances where race and socio-economic level were analyzed. The sex by socio-economic analyses yielded no significant interactions. Table 36 presents those dependent variables on which significant interaction occurred between race and socio-economic position for the male subjects under study. With IQ controlled eleven creativity variables were significant, two of which were non-verbal factors. On these non-verbal factors the lowest socio-economic, white subjects did better than the other seven groups of subjects. The highest socio-economic, white subjects were consistently superior to all other groups on the verbal factors with IQ covaried. Similar findings were noticed when achievement was controlled.

When the female subjects were evaluated in a race x socio-economic level analysis, the only variable on which significance ($<.025$) was observed was Ideational Fluency. The groups ranked in the following order: W1, W2, N4, W3, N2, N3, N1, and W4.

Table 36

Interaction Effects Between Race and Socio-economic Level on all Creativity Variables for the Male Subjects

Covariate	Dependent Variable	F	Level of Sig.	Ranking of Groups
IQ	Word Fluency	2.10	.10	W1-N1-W2-N4-N3-W3-N2-W4
	Consequences Flexibility	3.50	.025	W1-W2-N1-N3-N4-W3-W4-N2
	Consequences Fluency	3.18	.025	W1-W2-N4-N3-W3-N1-N2-W4
	Consequences Obvious	2.30	.10	W2-W1-N4-N3-W3-N1-W4-N2
	Consequences Remote	4.85	.005	W1-W2-N3-N4-W3-N2-N1-W4
	Consequences Breadth	3.07	.05	W1-W2-N1-N3-N4-W3-N2-W4
	Consequences Total Score	3.40	.025	W1-W2-N3-N4-N1-W3-W4-N2
	Unusual Uses Flexibility	4.11	.01	W2-W1-N1-N3-W3-N4-W4-N2
	Circles Flexibility	3.24	.025	W4-W2-W1-N3-W3-N1-N4-N2
	Circles Total Score	2.60	.10	W4-W2-W1-N1-N3-W3-N4-N2
	Creativity Total Score	2.47	.10	W1-W2-N1-N3-N4-W3-W4-N2
Ach.	Consequences Flexibility	2.74	.05	W1-W2-N1-N3-N4-W3-W4-N2
	Consequences Fluency	2.87	.05	W1-W2-N4-N3-W3-N1-N2-W4
	Consequences Obvious	2.23	.10	W2-W1-N4-N3-W3-N1-N4-N2
	Consequences Remote	3.77	.025	W1-W2-N3-N4-W3-N2-N1-W4
	Consequences Breadth	2.31	.10	W1-W2-N1-N3-N4-W3-N2-W4
	Consequences Total Score	2.88	.05	W1-W2-N3-N1-W3-W4-N2-N4
	Unusual Uses Flexibility	3.37	.025	W2-W1-N1-N3-W3-N4-W4-N2
	Circles Flexibility	3.23	.025	W4-W2-W1-N3-W3-N1-N4-N2
	Circles Total Score	2.59	.10	W4-W2-W1-N1-N3-W3-N4-N2

CONCLUSIONS

Discussion of the Results

The results of this study will be interpreted and discussed according to the order of presentation employed in the preceeding two chapters.

Socio-economic Differences Related to Creative Thought

Separate comparisons between the four socio-economic levels were done on the dependent variables for white subjects, Negro subjects, males, females, and for all groups combined. Since the criteria for assignment to the various socio-economic levels was consistent for all groups, it is possible to relate directly the findings between these groups.

The results of this aspect partially support the hypothesis of differences between socio-economic levels on scores from tests evaluating factors of creative thought. When scores of the white subjects at various socio-economic levels were compared, children from the higher levels were substantially superior to the lower socio-economic children in verbal factors of creative thinking. On non-verbal factors the reverse was true, that is, the lower socio-economic children exceeded the higher level subjects on all except one of these variables. These findings were noted both when intelligence and achievement were controlled individually.

There were no differences between the groups on the verbal originality score; whereas, the lower socio-economic children were superior to the higher subjects on non-verbal originality. On the other factors of creative thought, viz., fluency, flexibility, elaboration, and penetration, significant differences occurred between the socio-economic levels according to whether verbal or non-verbal areas were being evaluated.

With respect to the verbal responses provided by children from the four socio-economic levels, it should be noted that an inspection of the data did not reveal qualitative differences in the vocabulary patterns between the various groups. Lower status children did not tend to use "street" or "public" language to a greater degree than children from the higher social strata. Any differences between the groups that existed in the use of "formal language" of a written nature was not dramatic, although no systematic attempts were made to classify responses in terms of quality.

The fact that children from lower socio-economic circumstances were significantly weaker than higher status subjects in the verbal areas of creative thought cannot be explained in this study as being the results of a motivational problem. The subjects in this study, with very few exceptions, exhibited a high level of interest throughout the testing sessions. In fact, many subjects from the more deprived circumstances often asked for additional opportunities to respond to these instruments.

Perhaps the most reasonable explanation for the differences which were found to favor the higher socio-economic subjects in the verbal areas, and the lower socio-economic in the non-verbal factors, centers around the differences in the constellation of values between middle and working-class conditions of life. Apparently, parental values between these two large segments of our population differ substantially and have important consequences where child-rearing and parent-child relationships are concerned.

Many of these characteristics and their parameters are unknown. Important dimensions are being studied, as is evidenced by the work of Kohn (1963). This author points out that a major difference between these two groups is the need by higher socio-economic children for more skill related to personal, social, and intellectual abstraction than is required by lower social class persons. Families in more middle class circumstances are associated with a mode of existence which is primarily of a verbal nature. Language is important to these parents and their children are encouraged to become attentive to and skilled in this important area.

In contrast, families from the working class, who more typically come from lower socio-economic situations, are often associated with a predominantly non-verbal environment. Occupational circumstances for this group of individuals most often emphasize manipulative types of tasks. Their skill in motor activities often develops to a relatively high level. Such ability is rewarded resulting in greater skill in non-verbal areas being developed. Language development is minimal and infrequently rewarded. A value system develops which emphasizes predominantly non-verbal behavior. Such values are communicated to the children, who in turn become a part of the self-perpetuating cycle.

Differences between the socio-economic levels on the dependent variables for the Negro subjects were not observed. This was noted in spite of the fact that socio-economic status was evaluated using the same criteria as was employed for the white subjects. In the latter case, dramatic differences were seen between socio-economic levels.

The fact that membership at a specific socio-economic level for Negro subjects was unrelated to the level of performance on tests measuring factors of creative thought should be interpreted cautiously since more definitive data on important family variables were not available. The homogeneity between groups in their responses on the dependent variables is striking and is most likely not a chance finding.

Again, it seems reasonable to explain the results from the Negro subjects in terms of parental variables. Although there was a range on the socio-economic variables for the Negro children, the results indicated that they were responding as a relatively cohesive group. The hypothesis could be presented that this group represented predominantly the working class. Inspection of the occupations indicated that a very small number of the mothers or fathers, whichever was the head of the household, were employed in positions wherein dependence on language skill and abstract reasoning was essential. Those persons who were at a higher socio-economic level were so identified because of living in a desirable dwelling area and/or in a home which was well maintained.

Perhaps a more satisfactory explanation of the results from this sample of subjects involves a realization that a caste system, no matter how subtle, often will control norms and mores (and, thus, behavior) in a more dramatic way than will a class system. Although classes exist within castes, the latter often exerts a stronger influence in terms of a style of life. The result is that groups within a specific caste often develop cohesive goals because social needs supersede personal desires in terms of general importance.

In this context, therefore, it is reasonable to suggest that the parental values and associated child-rearing patterns for the Negro subjects, irrespective of their socio-economic circumstance, were relatively similar to each other. This resulted in the Negro children developing a similar mode of behavior. One manifestation of this style was that the children from different socio-economic levels responded similarly to tests evaluating creative thinking abilities. In this case, caste was more influential than class.

Higher socio-economic males were more verbally fluent and able to see problems significantly better than lower socio-economic males. Lower socio-economic girls were more original in a non-verbal sense than were the higher socio-economic girls.

The results observed between the socio-economic levels for each sex are no doubt contaminated by the large discrepancies noticed in the separate analysis for white and Negro subjects with respect to the number of variables which were significant. The fact that the white and Negro subjects were combined in these analyses probably resulted in an imprecise estimate of differences between socio-economic levels for males and females.

One could, however, justify the findings of higher socio-economic level males being more verbally fluent and penetrating than lower socio-economic males on a basis similar to the explanation presented earlier. Values of individuals from middle social class circumstances emphasize the desirability of males becoming skillful in verbal expression and in problem solving behavior. Children from lower socio-economic situations are most often not encouraged to develop skill in these two important areas.

Entrepreneural - Bureaucratic Variations

The second hypothesis of the study postulated that children from homes identified as being entrepreneural would be significantly superior to children from bureaucratic homes on the various factors of creative thought. This hypothesis was not supported by the results. Significant differences between the two groups occurred on none of the creativity variables.

The lack of differences between the groups on the dependent variables leads logically to the conclusion that any behavioral differences between adults associated with either the risk-taking type of occupation or one which is relatively "safe" is either not perceived and assimilated by their children into a characteristic mode of behavior, or the instruments used to assess the "creative" strategy are not sensitive to these differences.

While criteria suggested by Miller and Swanson (1958) were used to identify the entrepreneural and bureaucratic enterprises, several assumptions related to the psycho-social aspects of family interaction were necessarily made. Central among these assumptions were that children from entrepreneural homes were associated with a family situation which lacked close and continuing contacts with other members of the family, could be characterized as desiring to engage in risk-taking behavior, valued independence, were able to delay gratification, and "raised" themselves in terms of the responsibilities they were given at an early age. In contrast, it was necessary to assume the opposite for children from bureaucratic homes.

Perhaps a central reason for differences not being observed between these groups may have been due to these assumptions not being met. While it may be possible to relate certain behavioral constellations to specific classifications of occupations, the small number of entrepreneural families available in this study may have been atypical enough to be not representative of the entrepreneural population generally.

Therefore, there are two general problems that may have militated against differences between the groups being observed if, in fact, the hypothesis is true. First, assuming certain behavioral correlates from an occupation forces one to leap conceptually over important mediating considerations. Secondly, the small sample available in this study may not have been representative of an entrepreneural and bureaucratic population, particularly the former.

Sex Comparisons on Factors of Creative Thought

Differences between the responses of males and females on the creativity tests were analyzed separately by race. With intelligence and achievement controlled, the white females significantly out-scored the white males on nine of the thirteen verbal creativity factors. Differences between the white male and female subjects did not occur on the non-verbal factors nor on the test evaluating penetration.

In a general sense these findings are not surprising, although the magnitude of the number of variables on which differences were observed is rather dramatic. These findings are consistent with those noted by others who have assessed creative thinking abilities of children in the 5th grade (Torrance, 1956).

Substantial research effort has recently been directed toward better understanding differences between the sexes in the various cognitive areas. It has become apparent that wide variations often occur, and that educational plans and research efforts must be sensitive to these differences. One of the most perplexing difficulties in this respect is that the direction of the discrepancies between the sexes in areas of cognitive development and their magnitude are inconsistent. For example, Torrance (1956) observed in one study that females were superior to males at every grade level except in the 2nd, 3rd, and 4th grades. Smith (1962) found that pre-adolescent, intellectually superior boys were more creative on a battery of Guilford-type tests than were intellectually superior girls. To be sure, inconsistency in the findings is often related to the nature of the population from which the samples were selected as well as the instruments used for assessment.

There is reason to believe that girls are consistently higher than boys in language development, vocabulary, and verbal fluency. This becomes obvious toward the latter part of the elementary grades. Oetzel (1962) summarized studies on sex differences in cognitive development and indicated that in nearly one hundred percent of the studies reviewed the girls appeared higher in language development and verbal fluency.

It seems reasonable to suggest that the white females in this study scored higher than the white males for reasons which were associated with higher level of ability in general language. Indeed, the females scored higher as a group on the language sub-test of the Metropolitan Achievement Test. Even with achievement controlled, there apparently is a third variable, or a constellation of factors, operating which substantially influences their performance in verbal areas of cognitive development. Whether these variables are associated with child-rearing, cultural dimensions, or other psycho-social factors is yet to be determined.

A comparison between the Negro male and female subjects on the variables of creative thought was made. In only one case was there a significant difference between the sexes, and that in favor of the males on the penetration factor. In no other instance was significance even approached.

The same factors that resulted in such wide differences between the white males and females was obviously not present with the Negro subjects. The reasons for this are unclear. It might be postulated that Negro, females either are not encouraged to, or do not feel the need for developing differentially skill in the language areas of cognitive development. Without further specific information concerning psychological, sociological, and cultural factors, resulting in a relatively homogeneous response pattern for the Negro males and females, further interpretation would be too speculative.

Negro-White Differences in Creative Thinking

Scores on the dependent variables from the Negro subjects were compared with the responses of the white subjects. As was described in the preceeding chapter, with intelligence and achievement controlled, the white subjects were superior to the Negro subjects on most of the verbal and non-verbal factors. In several instances the results could not be interpreted due to a significant regression test between groups.

When it was noted that substantial differences existed between the Negro and white subjects, the data were divided by sex, so as to determine whether there was a difference in the degree to which one sex was contributing to these variations. Negro males were compared with white males on the creativity variables. Differences were observed on six of the eight non-verbal factors with no differences between the races occurring on verbal factors of creative thought.

With the females a different pattern emerged. The white females were significantly superior to the Negro females on ten of the thirteen verbal factors and on three of the eight non-verbal variables.

These data suggest that white males at the 5th grade level are superior to Negro males in non-verbal areas of creative thinking but not in verbal factors. In addition to being superior in verbal areas, white females at the 5th grade level score significantly higher scores in certain non-verbal areas of creative thought, viz., fluency and originality, than Negro females.

These findings are to some degree contrary to those reported by Iscoe and Pierce-Jones (1964). In their research they reported differences favoring Negro children in verbal ideational fluency but not in verbal spontaneous flexibility. The Unusual Uses Test evaluated the dependent variables in this study. No analysis was done between sexes.

In the present study differences were not observed between the total groups on the ideational fluency score from the Unusual Uses Test. However, when the sexes were evaluated separately, the white females were significantly superior to the Negro females. This same difference was not observed with the male groups.

No clear-cut explanations present themselves which could account for the differences between races noted in this study. The fact that lower socio-economic levels were represented disproportionately in favor of the Negro subjects when contrasted with the number of white children at these levels could be advanced as a legitimate hypothesis related to causality. Similarly, proportionately more white children were represented at the higher socio-economic levels than Negro subjects.

The fact that there were disproportionate differences between Negro males and Negro females, when contrasted with white children of the same sex, is particularly interesting. This finding reaffirms the often stated admonishment concerning the need for separate analyses between sexes when behavioral types of investigations are being conducted. Grouping the children without regard to sex often camouflages any real differences.

The reasons for these disproportionate differences are unclear. Apparently the environment that fosters or inhibits skill in verbal performance in males is to some degree similar for Negro and white males, whereas, the opposite is true in a certain measure for females. For more definitive answers to this question a comprehensive analysis of psycho-social variables, including parental and child-rearing patterns, needs to be conducted.

General Intellectual Giftedness and Creativity

Comparisons on the dependent variables between the intellectually gifted children and the individually matched group of intellectually normal children were made in several ways. An analysis of variance and several covariance procedures were done controlling for possible influential variables singly and various combinations. As was presented in the results section, it was found that no differences existed between the groups on the non-verbal factors. Significance was observed on the verbal factors differentially according to the variable(s) controlled. Male and female differences were not noted to any significant degree.

The results of this analysis suggest several things. First of all, the fact that differences between the groups on the non-verbal factors were not noticed may be associated with the fact that all of these children, both gifted and normal, were representative of a more middle than lower class situation. There was substantial homogeneity within and between groups on this important variable. This fact is suggested since in the larger analyses from which these subjects were selected, differences were seen between the social classes on the non-verbal factors, favoring lower class children. This is an indication of larger between group variance than within group.

Secondly, and perhaps most important for future research in creativity, when certain influential variables are controlled singly, collectively, or not at all, wide discrepancies existed in terms of on which dependent variables significant differences were seen, as well as the level at which significance occurs. At first blush, this may seem to be a rather pedestrian notion until one inspects the literature in creative thinking and observes that many of the studies analyze and discuss differences in creative thinking between groups in terms of a total creativity score. This results in a great possibility of substantial error occurring in both directions.

General Intellectual Retardation and Creative Thought

Since there were represented in the total sample a group of 48 retarded children, it was decided to match each child with an intellectually normal subject on sex, race, socio-economic level, and the classroom location. Differences were expected to be observed favoring the normal subjects on the creativity variables, particularly the verbal factors. Several studies (Tisdall, 1962; Rouse, 1965) have reported an advantage for mentally retarded children in special classes when compared with mentally retarded children in regular classes on divergent thinking abilities.

The primary objective of this supplementary investigation with the educable mentally retarded children was to determine on which of the creativity factors intellectually retarded children differed from intellectually normal children when variables of possible influence were controlled singly and in various combinations. Additionally, we were interested in observing the manner and degree to which the statistical values change as different variables were covaried.

From the results reported in the preceeding chapter related to a comparison between the intellectually retarded and intellectually normal, a number of conclusions seem appropriate. First, the number of variables on which differences were observed favoring the intellectually normal when variables of potential influence were not controlled reaffirms the notions presented in the literature concerning the fact that creativity is more highly related to intelligence at the lower levels than at the higher levels of general intellectual functioning. In the supplementary analysis which was done with the gifted subjects, we found that differences did not favor the intellectually superior when compared with intellectually normal children on many scores of creative thought. These findings support the "threshold" hypothesis, suggested by Torrance (1959) and Yamamoto (1961). Apparently creativity as measured by paper and pencil tests demands a minimum level of intellectual functioning. When intelligence was controlled, differences on creativity were erased, indicating the relative significance of this important variable for children at the lower levels of general intellectual functioning.

Secondly, it is interesting to notice that retarded children are not significantly lower than the intellectually normal on non-verbal measures of creativity. Similar results had been reported by others who have sampled from the educable population. These findings have often been interpreted as a manifestation of weak instrumentation. This interpretation is open to question in light of the substantial differences seen between other exceptional and normal groups of children on the non-verbal measures of creative thought. Further, the results of the factor analysis procedure (which was reported in the preceeding chapter) supports the theoretical position of there being a well identified constellation of non-verbal factors independent of the verbal dimensions.

The retarded children showing a poorer performance than the intellectually normal subjects on tests of creativity can be explained most easily by the intellectual deficit. It is likely, however, that this is only part of the story. A great number of controlled studies have demonstrated a significantly positive relationship between scores on creativity tests, positive psychological attributes, and an accepting and comforting social situation. Fewer studies have adequately demonstrated the influence of intelligence on creativity test scores in various populations of subjects. Thus, to attribute the lack of manifest creative thought to intellectual retardation *per se* may be foolhardy, especially since the retarded are frequently associated with a social circumstance which is highly inhibiting, structured, threatening, and rigid. Such an environment is known to stifle creative thought.

Simple Structure of the Variables under Study

The factors which emeraged from a factor analysis of the independent and dependent variables of the study are reported in the preceeding chapter in terms of those variables loading ± 30 or greater. Since a brief explanation and discussion follows the description of each factor, the reader is referred to that section of the report.

Implications From the Study

1. The primary implication of this study is that future research in the area of creativity should attach significance to the socio-economic circumstance of the white subjects but not necessarily for Negro children. Differences in creative thought favored the higher socio-economic children in most verbal areas and lower socio-economic children in many non-verbal areas. From the results of this study it is obvious that future research in creative thought must consider this important dimension. Now that this relationship has been identified and defined generally, an important next step for research needs to be a determination of *specific* environmental factors which in themselves

are related to socio-economic circumstance and which directly or indirectly influence performance in the various areas of creative thought.

2. The fact that differences on the dependent variables between socio-economic levels for the Negro subjects did not occur may be related to difficulties experienced in sampling at the higher socio-economic levels. Nevertheless, there is a definite indication for the need to replicate this aspect of the study. A more penetrating analysis of the specific factors related to levels of performance for this group is necessary.

3. The entrepreneural-bureaucratic dichotomy does not appear to be a necessarily valid procedure for assuming that families are more or less disposed toward engaging in risk-taking types of behavior. Assigning a person to one of these two classifications according to the occupation of the head of the household alone forces one to assume substantial homogeneity in behavioral characteristics within the groups without considering other important and related dimensions. This in itself is "risk-taking".

4. Scores of the white females on verbal factors far exceeded those of the white males. Differences did not occur in non-verbal areas. Again, the need for researchers to analyze separately behavioral data for the sexes is dramatized. Implicit in these findings is the notion that variations exist between boys and girls in motivational patterns, attitudes, and/or predicted ability -- all of which may in some manner be tied up with a certain relative level on creativity measures. A description of these controlling variables and their parameters is needed.

5. More questions were raised than were answered concerning the relative performance of Negro males and females. What are the dynamics which result in an equivalent performance between these groups in the

face of such substantial differences between the white males and females? What specific factors in the home and school environment result in the Negro females being relatively inhibited in their performance? How do the personal and social patterns differ between the Negro males and females, and in what way does this relate to their being creative? All of these questions are in need of exploration.

6. Several implications emerge from the factor analysis procedure done for the total groups of subjects on all of the independent and dependent variables. As has been implied by others, the data suggested that an evaluation of socio-economic status can be as effectively done using occupation of the head of the household as investigating other variables such as dwelling area, house type, and source of income. All of these variables were highly related to each other and loaded on the same factor.

Secondly, while certain creativity variables emerged independent of others, there was a consistent tendency for many of the creativity variables to be highly related to others. In contrast to certain points of view, the results of the factor analysis procedure reported here support the theoretical position of there being a well identified constellation of non-verbal factors related to creativity.

There still remains the need, however, to replicate the factor analysis procedures from Guilford on other groups of subjects, and to relate the tests developed by Torrance to specific factors in the *Structure of Intellect* model.

SELECTED REFERENCES

Anderson, H.H. Creativity as personality development. In H.H. Anderson (Ed.) Creativity and its cultivation. New York: Harper, 1959, 119-141.

Asch, S. Social psychology. Englewood Cliffs, N. J.: Prentice-Hall, 1952.

Atkins, D. C., and Lyerly, S. B. Factor analysis of reasoning tests. Chapel Hill, N.C.: University of North Carolina Press, 1951.

Ausubel, D.P. Theory and problems of child development. New York: Grune and Stratton, 1958.

Dow, A.B. An architect's views on creativity. In H.H. Anderson (Ed.) Creativity and its cultivation. New York: Harper, 1959, 30-43.

Drevdahl, J.E. Factors of importance for creativity. J. Dev. Psychol., 1965, 12, p. 21-26.

Getzels, J.W., and Jackson, F.W. Family environment and cognitive style: a study of the sources of highly intelligent and of highly creative adolescents. Amer. Soc. Rev., 1961, 26, p. 351-359.

Getzels, J.W., and Jackson, F.W. Creativity and intelligence. New York: John Wiley, 1962.

Guilford, J.P. The structure of intellect model: its uses and implications. Report from the Psychological Laboratory, and University of Southern California, April, 1960.

Hart, H.H. The integrative function in creativity. Psych. Quart. 1950, 24, p. 1-16.

Hoffman, M.L., and Hoffman, L.W. Review of child development research. New York: Russell Sage Foundation, 1964.

Hollingshead, A.B. Two factor index of social position. Mimeo, New Haven, Conn.

Iscoe, Ira, and Pierce-Jones, J. Divergent thinking, age, and intelligence in white and negro children. Child Development, 1964, 35, 785-797.

Klatskin, E.H. Shifts in child care practices in three social classes under an infant care program of flexible methodology. Am. J. Orthopsych. 1952, 22, 52-61.

Kohn, M.L., and Carroll, E.E. Social class and the allocation of parental responsibilities, *Sociometry*, 1960, 23, 372-392.

Kohn, M.L. Social class and parent-child relationships: an interpretation. *Am. J. Sociol.*, 1963, 68, 471-480.

Kohn, M.L. Social class and parental values. *Am. J. Sociol.*, 1959, 64, 337-351.

Lasswell, H.S. The social setting of creativity. In H.H. Anderson (Ed.) *Creativity and its cultivation*. New York: Harper, 1959, 203-221.

MacKinnon, D.W. What makes a person creative? *Saturday Review*, February 10, 1962a.

MacKinnon, D.W. Conditions for effective personality change. (Paper read at seventh ASCDC Assoc. for Supervision and Curriculum Development) Curriculum Research Institute, Western Section, Portland, Oregon, April 28-May 1, 1962b.

Maslow, A.H. Creativity in self-actualizing people. In H.H. Anderson (Ed.) *Creativity and its cultivation*. New York: Harper, 1959, 33-95.

Miller, D.R., and Swanson, G.E. The changing American parent. New York: John Wiley, 1958.

Oetzel, R. *Selected bibliography on sex differences*. Mimeo. Stanford University, 1962.

Pope, B. Socio-economic contrasts in children's peer culture prestige values. *Genet. Psychol. Monogr.*, 1953, 48, 157-220.

Progress Report, Community Renewal Program, Department of City Planning, Pittsburgh, Pennsylvania, July 1963.

Reid, J.B., King, F.J., and Wickwire, P. Cognitive and other personality characteristics of gifted children. *Psychology Reports*, 1959, 5, p. 729-737.

Riessman, F. *The culturally deprived child*. New York: Harper and Brothers, 1962.

Roe, Ann, Psychological examination of eminent biologists. *J. Consult. Psychol.*, 1949, 13, p. 225-246.

Roe, Ann, A psychological study of eminent psychologists and anthropologists: and a comparison with biological and physical scientists. *Psychol. Monogr.*, 1953, 67, No. 2, p. 55.

Rogers, C.R. Toward a theory of creativity, ETC: A Review of General Semantics, 1954, 11, 249-260.

Rouse, S.T. Effects of a training program on the productive thinking of educable mental retardates, Am. J. of Ment. Defic., 1965, 69, 666-673.

Sears, R.R., Maccoby, Eleanor E., and Levin, H. Patterns of child rearing. New York: Row Peterson, 1957.

Schachtel, R.G. Metamorphosis. New York: Basic Books, 1959.

Smith, R.M. Perceptions of self, others, and certain environmental aspects of high and low divergent, intellectually superior children, unpublished doctoral dissertation, Univ. of Illinois, 1962.

Swinehart, J.W. Socio-economic level, status, aspiration, and maternal role. Amer. Sociol. Rev., 1963, 28, 391-399.

Taylor, C.W. Widening horizons in creativity. New York: John Wiley 1954.

Tisdall, W.J. Productive thinking in retarded children, Excep. Child. 1962, 29, 36-41.

Torrance, E.P. Creativity - second Minnesota conference on gifted children. Minneapolis: University of Minnesota, Center for Continuation Study, 1960.

Torrance, E.P. Explorations in creative thinking in the early school years. Research Memo. BER-59-11, Bureau of Educational Research, University of Minnesota, August, 1959.

Torrance, E.P. Guiding creative talent. Englewood Cliffs, N.J.: Prentice-Hall, 1962.

Torrance, E.P. Rewarding creative behavior. Englewood Cliffs, N.J.: Prentice-Hall, 1965.

Tuma, E., and Livson, N. Family socio-economic status and adolescent attitudes to authority. Child. Develop., 1960, 31, 387-399.

U.S. Census of Population and Housing (Pittsburgh, Pennsylvania) 1960, Final Report PHC (1)-118, U.S. Government Printing Office, Washington, D.C., 1962.

Vaughn, W.F. General Psychology. New York: Doubleday Doran, 1936.

Warner, W.L., Meeker, Marchia, and Eells, K. Social Class in America. New York: Harper and Row, 1960.

Wilson, R.C., Guilford, J.P., Christensen, P.R., and Lewis, D.J. A factor-analysis study of creative thinking children, Psychometrics, 1954, 19, 297-311.

Witkins, H. Personality through perception. New York: Harper, 1954.

Yamamoto, K. Educational achievement of highly creative students: threshold of intelligence. Research Memo. BER-61-5, Bureau of Educational Research, University of Minnesota, December 1961.

APPENDIX A

Evaluative Criteria For Dwelling Area, House Type, Source of Income, and Occupation, and Procedures For Collecting These Data

Evaluative Criteria For Dwelling Area And Procedures Used In Collecting The Data

The dwelling area of each subject in the study was judged using the classification and evaluation systems developed by the U.S. Department of Commerce (1962) and the Department of City Planning, Pittsburgh, Pennsylvania (1963). These reports contain a classification and evaluation of the location and extent of substandard and blighted housing for each block in the City of Pittsburgh. Housing units are classified as being either sound, deteriorated, or dilapidated. These conditions are further judged according to availability of plumbing facilities. In their evaluation of housing units, census enumerators considered other environmental conditions such as land crowding, street traffic, and community facilities. The above-mentioned reports provide the specific criteria used for classifying and evaluating factors related to dwelling area.

After the data were classified, they were quantified using the American Public Health Association's Appraisal Method as adapted by the Pittsburgh Department of City Planning (1962). Table 37 describes the classification system used to evaluate the condition of housing units and the penalty weight assigned to each category.

The number of housing units in each classification were converted to a percentage of the total number of units per block and these percentages multiplied by the appropriate penalty weight for each classification. These penalty weights were then added to get a total dwelling area score for each city block. The weighted penalty score for each block was assigned to one of six groups which vary from an area in which no renewal is needed to areas which require complete clearance and redevelopment measures. All of these data were available from the 1960 U.S. Census of Population and Housing. Table 38 shows the class divisions and their associated range of penalty weights. The number of subjects in this study who were assigned to each of the classes and the percentage of the total is also listed.

Table 37

Classifications and Definitions for Evaluating Housing Units and Their Associated Penalty Weights

Census Description of Housing Categories	Specific Plumbing Facilities				Penalty Weight
	Hot Piped Water Inside Structure	Cold Piped Water Inside Structure	Flush Toilet Inside Structure	Bathtub or Shower	
Sound Structure With All Plumbing Facilities	Available	Available	Exclusive Use	Exclusive Use	0
Sound Structure Lacking Some or All Facilities	May Lack	May Lack	May Lack or Share	May Lack or Share	2
Deteriorated Structure With All Plumbing Facilities	Available	Available	Exclusive Use	Exclusive Use	3
Deteriorated Structure Lacking Some or All Facilities with Flush Toilet	May Lack	May Lack	Exclusive Use or Share	May Lack	4
Deteriorated Structure Lacking Some or All Facilities with No Flush Toilet	May Lack	May Lack	Not in Structure	May Lack	5
Dilapidated Structure	Not Reported	Not Reported	Not Reported	Not Reported	6

Table 38

Classes of Dwelling Areas, Their Respective Penalty Weights And the Number and Percentage of Subjects Living in Each Dwelling Area

Classes of Dwelling Areas	Range of Penalty Weights	White		Negro	
		Number	Percent	Number	Percent
A	0-4.9	141	57.79	91	25.35
B	5.0-12.9	46	18.85	78	21.73
C	13.0-22.9	30	12.29	51	14.21
D	23.0-35.9	18	7.38	84	23.40
E	36.0-60.0	9	3.69	55	15.32
	TOTALS	244		359	

The city block in which each child in this study lived was located on a large map of Pittsburgh. A determination was made as to whether they lived on the even or odd side of the street. Each city block on the large map of Pittsburgh was color coded according to its specific classification of dwelling area as evaluated by the Census Bureau and the Pittsburgh City Planning Commission, using the aforementioned criteria and technique. The classification for each dwelling area was then quantified [A=1 (high), B=2, C=3, D=4, E=5 (low)] and the appropriate score for each subject recorded on the master data sheets.

Evaluative Criteria For House Type And Procedures Used In Collecting The Data

The condition of the house in which each subject in the study lived was evaluated first by the project staff, individually and collectively, and later by a certified real estate appraiser. The criteria from the Warner Scale (1960) were adapted and extended so as to consider the substantial variations in the characteristics of a highly urban city presently undergoing extensive urban renewal. Such were not the circumstances in the less urban community on which the Warner Scale was developed. Further, Pittsburgh is unique in terms of the terrain and extent of usable land even within a city block.

Information concerning the location of the house in which each subject in the study lived was ascertained from the school's cumulative folders. This information was gathered on approximately 900 5th grade children.

In order to reduce an unreasonable expenditure of time and money on this aspect of the collection of data, and to allow for a check on inter-scorer reliability, it was decided to take a Polaroid picture of each house. A member of the project staff drove to the location of each subject's house, took a picture of the house from an angle which provided for maximum coverage, identified the house with the subject's identification number, and completed a check list which distinguished various characteristics of the house not readily observable from the picture, but which are considered by Warner to be significant. The following information appeared on the check list.

ID No._____

TYPE

Frame____ Brick____ Block____ Combination____

Single Family____ Double____ Duplex____ Row____

Large Apartment____ Small Apartment____ Over Store____

Converted Multiple____

PLAY AREA

Grass____ Concrete____

LAWN

Excellent____ Good____ Fair____ Poor____ None____

WINDOWS

Painted and Intact____ Need Paint and Intact____

Need Paint and Not Intact____

STREET AREA and SURROUNDINGS

Excellent____ Good____ Fair____ Poor____

OTHER COMMENTS

The pictures of the houses were mounted on a section of the appropriate check sheet and separated according to whether it was a single family, duplex, double, row, large apartment, small apartment, or an over-a-store dwelling. The pictures in each dwelling classification were then compared and ranked with all other houses in that classification according to the size, condition, and value of the structure. The nature of the play area, lawn, and street area for each house was also considered in the ranking.

After the houses in each of the seven dwelling categories were compared with each other and ranked, the pictures were divided into piles and evaluated as being either excellent, good, good to fair, fair, fair to poor, poor, or dilapidated. Initially, comparisons were made within each of the seven dwelling categories, viz., single family, double, duplex, row, small apartments, large apartments, or over stores.

In order to quantify the ratings, it was necessary to relate the evaluations within each dwelling category with those of the other six categories. The counsel of an expert real estate appraiser was obtained. The judgment was made that an excellent single family dwelling did not compare in terms of market value with structures in any of the other dwelling categories, even though they may have been judged as being in excellent condition. It was decided that good single family dwellings could be equated with excellent duplex houses in terms of market value. Further judgments were made between dwelling categories in terms of their presently estimated market value. Table 39 lists the types of houses, their respective ratings, the comparisons between dwelling categories in terms of their ratings, and the weightings assigned to each level.

In this study, houses were not located in those cells not containing a rating.

Inter-scorer reliability checks were made in connection with the classification of houses as being excellent, good, good to fair, fair, fair to poor, poor, or dilapidated in each of the seven dwelling categories. After a short training session, using data and pictures not associated with the project, three judges evaluated independently 20 randomly selected pictures in each of the seven dwelling categories. The three judges each made a total of 140 judgments, or 20 ratings in each of the seven categories. Perfect agreement between judges ranged from 91% to 97%. In only two of the 140 judgments were judges in disagreement by more than one classification. In no case did judges disagree more than by two classifications.

All of the pictures were then judged and assigned to one of the

Table 39

Types of Houses, Their Classifications, Ratings, and Assigned Weights

	TYPE OF HOUSE						
Weight	SF	Duplex	Double	Row	Small Apart.	Large Apart.	Over Stores
1	Excellent						
2	Good	Excellent					
3	Fair	Good	Good	Good	Good	Good	
4		Fair	Fair	Fair	Good to Fair	Good to Fair	Good
5	Poor	Poor			Fair to Poor	Fair to Poor	Fair to Poor
6				Fair to Poor			Poor
7				Poor			
8				Dilapidated			

classifications listed in Table 39. The opinion of an expert real estate appraiser was then obtained and each picture was scored accordingly. Finally this information was recorded for each child on the master data sheets.

Criteria For Evaluating The Occupation Of The Head Of The Household And Procedures For Collecting The Data

Information concerning occupations of the mother and father, or legal guardian, of each child was gathered from the records of each school. The occupational information for each child's parents was compared with the records of the Home and School Visitor. When discrepancies occurred between these two sources, the principal of each school requested this information from the parents. A determination was made as to the head of the household on the basis of which parent contributed the greatest amount of financial support to the family.

The occupational data were classified according to the system developed by Hollingshead (1957). It was felt that the Hollingshead criteria were more comprehensive and specific for a highly urban city such as Pittsburgh. After the data were classified, they were weighted from 1 to 8, and the appropriate score was recorded on the master data sheet for each child. Table 40 describes the general occupational categories, provides examples of jobs associated with each, and lists the weights assigned to each category.

Table 40

Occupational Categories, Examples of Positions Within Each, and the Weight Assigned to Each Classification

Occupational Classification	Examples of Jobs within Categories	Weight
Major professional, top executives, and proprietors of large concerns (valued at $100,000 or above)	Judges, bank presidents, military officers, (major and above), contractors, dairy owners, C.P.A., clergymen, dentists, lawyers, physicians, university teachers, architects.	1
Lesser professionals, managers of businesses, and proprietors of medium sized businesses (valued between $35,000 and $100,000)	District managers, postmasters, office managers, jewelers, store owners, accountants, nurses, military officers (captain or below), teachers, opticians, engineers, (not college graduates), store managers.	2
Minor professionals, administrative personnel, and small independent businesses (valued between $6,000 and $35,000)	Actors, reporters, travel agents, taxi company, gas stations, small groceries, purchasing agents, sales representatives, shop managers, section heads, chief clerks, insurance agents.	3

3

Table 40, cont.

Occupational Categories, Examples of Positions Within Each, and the Weight Assigned to Each Classification

Occupational Classification	Examples of Jobs within Categories	Weight
Clerical, sales, and technical workers and owners of little businesses (valued under $6,000)	Bank clerks, post office clerks, claims examiners, inspectors, draftsmen, owners of newstands, shipping clerks, clerical, driving teachers, employment interviewers.	4
Skilled manual employees	Barbers, watchmakers, sheetmetal workers, policemen , printers, masons, chefs, cable splicers, diemakers, firemen, R.R. brakemen.	5
Semi-skilled employees and machine operators	Hospital aids, shapers, paint sprayers, welders, trainmen, not skilled steelworkers, taxi drivers, foundry workers, short order cooks, bus drivers, bartenders.	6
Unskilled employees	Messengers, laborers, janitors, hod carriers, freight handlers, deck hands, car helpers, parking lot attendants, domestics, window cleaners.	7
Public or private relief or Unemployed		8

from: Hollingshead, A.B., Two Factor Index of Social Position, Mimeo., New Haven, Connecticut, $1.00, 1957

Criteria For Determining Source Of Income For The Head Of The Household

As soon as the occupation of the head of the household of each child in the study was ascertained, a judgment was made concerning the primary source of income. The basic criteria for classifying occupations related to this factor was that suggested by Warner (1960). These criteria were modified a bit in order to provide for higher reliability in judging the source of income from the occupations. After a short training period, two judges independently rated 30 occupations and agreed 97% of the time. One judge then rated all of the protocols scoring for source of income as inferred for occupation of the head of the household.

Table 41 describes the specific criteria and the associated weight for each of the sources of income dimensions.

Table 41

Descriptive Criteria Concerning Source of Income

Category	Description of the Categories	Weight
1. Inherited wealth	Families classified in this category are those who live on money made by a previous generation. This includes money derived from savings and investments or business enterprises inherited from an earlier generation. Inherited wealth is frequently referred to as "old money", in contrast to "new money". Such wealth should provide the basic income for families so classified.	1
2. Earned wealth	Families or individuals so classified must be able to live on savings or investments earned by the present generation. This category implies considerable wealth, for the individual lives on interest from capital and has amassed sufficient money that he does not need to work. This source of income applies most frequently to men who have made a large amount of money and are able to retire and live comfortably on their own earnings. They differ from individuals who are retired because of old age and live on pensions. In this situation, it is not that they are too old to work, but that they no longer need to work. The major distinction between inherited wealth and earned wealth is that "new money" is providing the basic income in the latter case.	2

Table 41, cont.

Descriptive Criteria Concerning Source of Income

Category	Description of the Categories	Weight
3. Profits and fees	This includes money that is paid to professional men for services and advice. It also includes money made by owners of businesses, for sale of goods, and royalties paid to writers, musicians, and so on. This category includes executives who receive a share of profits from their concern.	3
4. Salary	This is a regular income paid for services on a monthly, or yearly, basis. This category also includes commission type of salary paid to salesmen.	4
5. Wages	This is distinguished from salaries since the amount is determined by hourly rate. It is usually paid on a daily or weekly basis. In this case, those who work by piece work are included. In this category weekly checks are paid as distinguished from monthly checks.	5
6. Private relief	This includes money paid by friends or relatives for the sake of friendship, or because of family ties. It also includes money given by churches, associations, and so on, when the agency does not reveal the names of those receiving help. People receiving this form of income usually have no money themselves, and only through this help can be saved the shame of asking for public relief.	6

Table 41, cont.

Descriptive Criteria Concerning Source of Income

Category	Description of the Categories	Weight
7. Public relief or non-respectable income	This includes money received from a government agency or some semi-public charity organization which does not mind revealing the names of those receiving help. In addition, a non-respectable income includes money made from illegal occupation such as gambling, prostitution, and moon-shining.	7

APPENDIX B

Descriptive Data For The Subjects Under Study

Table 42

Descriptive Data On The Four Groups Under Study

Variable	Male White		Female White		Male Negro		Female Negro	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
IQ	107.41	11.56	109.08	11.32	99.01	10.22	100.51	9.88
Achievement (Average)	5.83	1.16	5.87	1.18	4.97	.88	4.99	.88
Paragraph Meaning	5.58	1.44	5.54	1.38	4.84	1.23	4.65	1.15
Reading	6.06	2.19	5.86	1.87	4.76	1.52	4.80	1.43
Language	6.54	1.74	6.80	2.02	5.30	1.13	5.50	1.24
Arithmetic Problems	5.81	1.26	5.57	1.30	4.84	.94	4.63	.96
Word Discrimination	5.33	1.07	5.46	.99	4.73	.90	4.70	.85
Spelling	6.00	1.36	6.26	1.31	5.41	1.37	5.60	1.26
Arithmetic Computation	5.69	.99	5.69	1.05	5.12	.79	5.09	.83
Warner Summary	43.99	16.16	46.56	16.15	57.86	12.42	61.16	12.64
Warner Dwelling Area	3.25	1.91	3.97	2.52	5.20	2.85	6.21	3.94
Warner House Type	8.82	6.39	9.83	6.48	12.91	5.75	13.46	5.54
Warner Occupation	18.07	7.60	18.85	7.34	24.20	6.15	25.72	7.21
Warner Source of Income	13.83	3.05	13.90	3.09	15.66	2.71	16.84	6.28
Hollingshead Total	47.80	17.95	50.36	17.41	62.42	14.28	69.42	15.58
Hollingshead Occupation	31.56	13.29	33.17	12.88	42.33	10.74	44.20	10.94
Hollingshead Education	16.24	5.81	17.43	5.46	20.14	4.96	20.94	4.56
Equal Weights Total	17.53	6.57	18.96	6.33	23.24	5.03	24.56	4.91
Dwelling Area Classification	1.63	1.00	1.98	1.26	2.61	1.41	3.00	1.41
House Type Classification	2.94	2.13	3.28	2.16	4.25	1.97	4.44	1.89
Occupation Classification	4.52	1.90	4.74	1.84	6.06	1.53	6.40	1.50
Education Classification	4.07	1.45	4.37	1.37	5.05	1.22	5.23	1.10
Source of Income Classification	4.61	1.02	4.62	1.02	5.24	.92	5.47	1.02
Ideational Fluency	42.13	12.22	45.83	12.25	37.69	12.37	42.61	13.19
Word Fluency	28.72	8.05	30.19	8.45	25.43	8.21	28.09	7.87

Table 42, cont.

Descriptive Data On The Four Groups Under Study

Variable	Male White		Female White		Male Negro		Female Negro	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Associational Fluency	11.30	4.30	12.42	4.44	9.16	3.88	10.18	4.16
Making Objects	49.55	10.75	50.63	9.43	44.62	10.18	45.75	11.68
Seeing Problems	21.59	7.96	22.37	7.27	17.32	7.40	17.40	6.36
Consequences Flexibility	19.57	8.90	22.18	8.54	16.41	7.76	18.16	7.88
Consequences Fluency	45.16	18.97	51.35	17.85	38.82	16.31	41.35	15.52
Consequences Near	36.00	16.59	40.27	15.95	31.15	13.62	33.25	12.79
Consequences Remote	9.16	5.44	10.71	6.22	7.63	5.13	8.10	5.20
Consequences Breadth	18.68	4.93	19.60	4.34	16.64	4.27	17.16	3.86
Consequences Total	83.24	30.73	93.11	27.80	72.12	25.99	76.68	25.27
Unusual Uses Fluency	37.59	33.01	35.37	10.63	30.04	10.52	30.92	9.20
Unusual Uses Flexibility	19.61	6.33	20.68	6.70	16.45	5.70	17.32	5.78
Unusual Uses Breadth	16.39	5.31	16.18	3.59	14.36	3.68	14.43	3.39
Unusual Uses Total	75.86	18.43	72.25	18.54	60.93	18.14	62.49	16.89
Circles Fluency	12.11	7.46	11.79	4.83	10.01	4.16	10.44	4.05
Circles Flexibility	8.10	3.36	8.37	3.97	6.90	3.50	7.41	3.47
Circles Breadth	7.17	2.85	7.30	3.17	6.73	3.04	6.91	3.07
Circles Originality	9.39	4.78	9.02	4.75	7.33	4.48	7.45	4.52
Circles Elaboration	11.29	5.70	12.46	6.38	10.57	5.86	11.50	5.68
Circles Total	47.45	16.28	48.87	18.59	41.45	16.33	43.68	16.38
Creativity Total	354.39	76.87	374.74	77.58	305.34	79.83	324.80	73.55

Table 43

Means On The Dependent Variables For White, Male and Female Subjects at Each Socio-economic Level

Dependent Variables	SE1		SE2		SE3		SE4	
	F	M	F	M	F	M	F	M
Ideational Fluency	51.69	47.37	44.84	40.85	42.68	37.22	37.33	34.30
Word Fluency	33.74	32.37	29.50	28.15	27.62	25.13	27.25	22.40
Associational Fluency	14.40	13.61	12.61	10.44	10.29	8.96	10.92	9.40
Unusual Uses Fluency	35.76	34.02	35.53	48.41	35.09	29.70	34.25	30.00
Unusual Uses Shifts	22.71	20.28	20.47	21.62	19.12	16.70	18.67	15.40
Consequences Obvious	42.95	37.80	38.71	38.56	40.68	32.57	34.67	25.60
Consequences Remote	11.67	10.89	10.21	94.62	99.12	67.39	11.25	56.00
Making Objects	53.57	51.74	48.74	46.85	48.35	49.91	52.75	51.50
Seeing Problems	25.33	25.93	21.79	20.13	20.88	17.78	18.08	16.00
Circles Fluency	12.09	11.15	10.34	13.67	11.94	10.61	14.92	13.90
Circles Shifts	8.85	7.94	7.47	8.38	8.44	7.04	9.25	10.20
Circles Originality	8.76	8.96	8.13	9.85	9.00	8.57	12.75	11.50
Circles Elaboration	12.38	11.89	11.97	10.05	12.18	10.26	15.08	15.70
Consequences Shifts	25.07	22.35	22.02	20.28	19.68	15.70	19.58	12.90
Consequences Fluency	54.57	48.70	48.87	48.03	50.88	39.30	49.25	31.20
Consequences Breadth	21.07	20.20	19.53	19.13	18.12	16.61	18.83	14.70
Consequences Total	100.71	90.80	90.42	87.23	88.65	71.61	87.67	59.60
Unusual Uses Breadth	17.05	16.70	16.24	17.72	15.24	14.26	15.58	14.70
Unusual Uses Total	75.62	71.00	72.24	94.59	69.44	60.65	68.50	60.10
Circles Breadth	7.88	7.37	6.32	7.49	7.47	6.13	7.92	7.40
Circles Total	49.79	47.28	44.24	47.64	49.03	42.57	59.92	58.70
Creativity Total	404.71	380.09	363.58	359.31	354.53	312.83	362.42	312.00

Table 44

Means On The Dependent Variables For Negro, Male and Female Subjects at Each Socio-economic Level

Dependent Variables	SE1		SE2		SE3		SE4	
	F	M	F	M	F	M	F	M
Ideational Fluency	38.86	44.50	42.57	33.00	42.26	39.44	42.82	38.53
Word Fluency	26.57	28.50	28.22	23.00	29.00	26.00	26.45	26.69
Associational Fluency	9.14	12.13	11.90	9.06	9.68	9.36	97.10	8.19
Unusual Uses Fluency	29.14	31.25	31.52	25.87	31.46	32.30	31.13	30.36
Unusual Uses Shifts	16.00	17.75	17.20	14.49	17.12	17.66	17.84	16.14
Consequences Obvious	26.71	32.50	36.25	24.30	31.57	33.49	33.77	34.78
Consequences Remote	7.57	5.63	9.00	6.45	7.51	8.47	8.26	7.81
Making Objects	44.43	46.13	46.25	44.30	46.22	44.75	44.61	44.41
Seeing Problems	12.43	23.62	20.10	16.60	16.20	16.87	17.53	17.81
Circles Fluency	9.71	9.00	10.52	9.13	10.80	10.81	9.90	9.69
Circles Shifts	6.86	7.00	7.40	6.15	8.70	7.61	7.16	6.33
Circles Originality	7.29	6.12	7.65	6.64	7.48	7.94	7.29	7.19
Circles Elaboration	11.29	11.38	11.82	9.49	12.21	10.43	11.48	12.08
Consequences Shifts	16.00	18.38	19.97	12.77	17.05	18.00	18.40	17.33
Consequences Fluency	34.29	38.12	45.25	31.32	39.10	41.99	42.02	42.00
Consequences Breadth	17.14	18.25	18.20	14.91	16.78	17.40	16.87	16.92
Consequences Total	67.43	74.75	83.42	59.15	76.23	77.61	77.76	76.72
Unusual Uses Breadth	14.14	14.88	14.22	13.36	14.57	14.96	14.85	14.25
Unusual Uses Total	59.29	63.87	61.85	53.72	61.86	65.10	63.82	60.75
Circles Breadth	7.00	6.88	7.02	6.09	7.57	7.27	6.63	6.39
Circles Total	42.14	45.00	44.42	37.49	50.63	43.39	42.24	41.69
Creativity Total	300.29	338.50	330.97	269.98	328.77	319.13	323.95	314.64

Table 45

Means for Entrepreneurial-Bureaucratic on all Creativity Variables

Creativity Variable	Entrepreneurial Female	Entrepreneurial Male	Bureaucratic Female	Bureaucratic Male
Ideational Fluency	61.9444	57.2778	52.7778	49.3889
Word Fluency	46.0556	44.6111	39.4444	40.6667
Associational Flu.	16.0000	15.3333	12.8889	11.8889
Seeing Problems	25.0556	24.0556	23.3889	21.6111
Conseq. Flex.	20.9444	24.3889	19.9444	19.7222
Conseq. Flu.	48.6111	52.8333	46.1111	43.6667
Conseq. Near	39.8333	42.8333	36.4444	35.2222
Conseq. Remote	8.7778	10.0000	9.6667	8.6111
Conseq. Breadth	19.8333	19.8333	19.5556	18.2778
Conseq. Total	89.3333	97.5556	85.6667	81.5000
Unusual Uses Flu.	38.3333	41.5000	37.6111	33.5000
Unusual Uses Flex.	21.5556	24.2778	23.2778	20.7222
Unusual Uses Breadth	16.2778	17.7778	18.3889	16.0556
Unusual Uses Total	76.1667	83.6111	79.3333	70.2778
Circles Fluency	11.0556	11.7778	11.1667	9.9444
Circles Flexibility	7.5556	8.8333	6.9444	7.5556
Circles Breadth	6.8889	7.5556	6.3333	7.3333
Circles Originality	7.6667	9.1667	8.6111	8.8333
Circles Elaboration	10.1111	13.8333	11.0000	10.0556
Making Objects	51.3889	51.7778	48.1667	47.6111
Circles Total	43.3333	51.0000	43.9444	43.6661
Creativity Total	409.2778	425.5000	361.1111	366.6111